



OCS Information Report
MMS 89-0043

OCS National Compendium

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Outer Continental Shelf Oil and Gas
Information through September 1988



U.S. Department of the Interior
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- Figure 2-5 on page 42.
- Figure 3-6 on page 71.
- Figure 3-9 on page 78.

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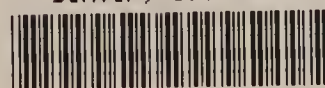
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Preface

The Outer Continental Shelf Information Program (OCSIP) of the Minerals Management Service (MMS) has historically made available, free of charge, two types of documents (summary reports and indexes) that have described oil- and gas-related activities in each of the four MMS OCS Regions: the Alaska, the Atlantic, the Gulf of Mexico, and the Pacific. The OCSIP was mandated by the 1978 Amendments to the OCS Lands Act (43 U.S.C. 1352). Many facets of the Federal oil and gas leasing program have changed significantly in the 10 years since inception of the OCSIP. In recognition of these changes, and in an attempt to reduce administrative costs, the OCSIP has recently modified its publications program.

The OCSIP now produces or will be producing these documents:

- An annual *OCS Leasing/Operations Procedures* booklet (formerly the *Index*) (in progress);
- A streamlined, annual *Offshore/ Onshore Regional Update* report for each of the four MMS OCS Regions (formerly the *Summary Reports*);
- A biennial *National OCS Compendium* that presents historical information on all of the OCS Regions;
- A plate series detailing regional offshore and onshore information for the Pacific and Alaska OCS Regions; and
- An annual *OCS Directory* of Federal and State agencies and their OCS responsibilities.

To order any of these documents, or for more information about them, contact the OCSIP at the following address and telephone number.

OCS Information Program
Office of Offshore Information & Publications
Minerals Management Service, MS 642
381 Elden St.
Herndon, VA 22070-4817
(703) 787-1080
(FTS) 393-1080

Abbreviations and Acronyms

ACOE	- Army Corps of Engineers	Mcfd	- thousand cubic feet per day
ANWR	- Arctic National Wildlife Refuge	MMbbl	- million barrels
APD	- Application for Permit to Drill	MMBO	- million barrels of oil
		MMbpd	- million barrels per day
bbl	- barrel	MMcfd	- million cubic feet per day
Bbbl	- billion barrels	MMS	- Minerals Management Service
BBO	- billion barrels of oil	NEPA	- National Environmental Policy Act
Bcfd	- billion cubic feet per day	NGL	- natural gas liquids
BOE	- barrels of oil equivalent	NOAA	- National Oceanic and Atmospheric Administration
bpcd	- barrels per calendar day	NOI	- Notice of Intent
bpd	- barrels per day	NOS	- Notice of Sale
		NPDES	- National Pollutant Discharge Elimination System
CCC	- California Coastal Commission	NPRA	- National Petroleum Reserve-Alaska
CER	- Categorical Exclusion Review	NPS	- National Park Service
CFR	- Code of Federal Regulations	NTL	- Notice to Lessees
CIDS	- Concrete Island Drilling System		
COST	- Continental Offshore Stratigraphic Test	OPEC	- Organization of Petroleum Export Countries
CTGS	- Central Texas Gathering System	OCRM	- Office of Ocean and Coastal Resource Management
CZMA	- Coastal Zone Management Act	OCS	- Outer Continental Shelf
CZMP	- Coastal Zone Management Program	OCSIP	- Outer Continental Shelf Information Program
		OCSLA	- OCS Lands Act
DOCD	- Development Operations Coordination Document	OFR	- open file report
DOE	- Department of Energy	OIP	- Office of Offshore Information and Publications
DOI	- Department of the Interior	OPD	- official protraction diagram
DOT	- Department of Transportation	OS&T	- Offshore storage & treating vessel
DPP	- Development and Production Plan	OSIM	- Office of Strategic and International Minerals
EA	- environmental assessment	P&A	- plugged and abandoned
EIR	- environmental impact report	PANGL	- Point Arguello Natural Gas Line Company
EIS	- environmental impact statement	PAOS	- Point Arguello Offshore System
EP	- Exploration Plan	PAPCO	- Point Arguello Pipeline Company
E&P	- Exploration & Production	PARS	- Port Access Route Study
EPA	- Environmental Protection Agency	PDP	- Preliminary Development Plan
ER	- Environmental Report	PNOS	- Proposed Notice of Sale
ESCI	- Exploration Services Company Inc.	POPCO	- Pacific Offshore Pipeline Company
ESP	- Environmental Studies Program	PRESTO	- Probabilistic Resource Estimates - Offshore
EEZ	- Exclusive Economic Zone		
		RCRA	- Resource Conservation and Recovery Act
FEIS	- Final Environmental Impact Statement	RTMP	- Regional Transportation Management Plan
FR	- Federal Register	RTWG	- Regional Technical Working Group
FWS	- Fish and Wildlife Service		
		SCPS	- Southern California Pipeline System
gal	- gallon	SEIR	- supplemental environmental impact report
GAO	- U.S. Government Accounting Office	SESP	- Socioeconomic Studies Program (Alaska OCS)
GOA	- Gulf of Alaska	SI	- International System of metric units
GGPC	- Gaviota Gas Plant Company	SLC	- State Lands Commission
G&G	- geological and geophysical	SWEPI	- Shell Western Exploration and Production, Inc.
GTC	- Gaviota Terminal Company		
		Tcf	- trillion cubic feet
HCTMP	- Hudson Canyon Transportation Management Plan	TLWP	- Tension Leg Well Platform
HIOS	- High Island Offshore System	TOC	- total organic carbon
		TPU	- Technical Publications Unit
JRP	- Joint Review Panel	TSS	- traffic separation scheme
KSST	- Kodiak Shelf Stratigraphic Test		
LOOP	- Louisiana Offshore Oil Port	U.S.C.	- United States Code
LPG	- liquid petroleum gases	USCG	- U.S. Coast Guard
		USGS	- U.S. Geological Survey
Mbbl	- thousand barrels	VLCC	- very large crude carrier
Mbpd	- thousand barrels per day	WTI	- West Texas Intermediate
Mcf	- thousand cubic feet		

English-Metric Conversion

Measurements in this document are reported in the format that reflects the most common usage. The following table provides the factors for converting measurements to either U.S. Customary units or International System (SI) of metric units.

U.S. Customary unit	(multiply by to obtain)	SI Metric unit
inches	2.54	centimeters
feet.....	0.3048	meters
statute miles	1.609	kilometers
nautical (geographic) miles	1.852	kilometers
acres	0.4047	hectares
barrels (U.S.) petroleum	0.15897	cubic meters
gallons	3.785	liters
cubic feet.....	0.02832	cubic meters
tons, long (deadweight)	1.016	metric tons

SI Metric unit	(multiply by to obtain)	U.S. Customary unit
centimeters	0.3937	inches
meters	3.281	feet
kilometers	0.6214	miles, statute
kilometers	0.5400	miles, geographic (nautical)
hectares	2.471	acres
cubic meters	6.290	barrels (petroleum, 1 bbl = 42 gal)
liters	0.2642	gallons
metric tons	0.9842	tons, long (deadweight) (2,240 lb)

NOTE: Distances on the Federal Outer Continental Shelf and on land are measured in statute miles. Distances on the offshore State lands are measured in nautical (geographic) miles. Generally, coastal States were granted authority over offshore lands to a distance of 3 nautical miles from their coasts by the Submerged Lands Act (43 U.S.C. 1301 et seq.). The offshore authority of Florida (on its Gulf Coast side only) and Texas extends to 3 marine leagues (approximately 10.35 statute miles) for historic reasons.

Contents

PREFACE, *iii*

ABBREVIATIONS AND ACRONYMS, *iv*

ENGLISH-METRIC CONVERSION, *v*

INTRODUCTION, *1*

Purpose of the Compendium, *1*

History of the OCS Oil and Gas Program, *1*

Importance of the OCS Oil and Gas Program, *1*

Compendium Organization, *3*

Additional Readings, *3*

1. OCS REGIONAL GEOLOGY, PETROLEUM POTENTIAL, AND RESOURCE ESTIMATES, *5*

Alaska OCS Region, *8*

Geology and Petroleum Potential of the Alaska OCS Region, *8*

Beaufort Sea Planning Area, *8*

Chukchi Sea Planning Area, *8*

Hope Basin Planning Area, *10*

Norton Basin Planning Area, *11*

Navarin Basin Planning Area, *11*

St. George Basin Planning Area, *11*

North Aleutian Basin Planning Area, *13*

Shumagin Planning Area, *14*

Gulf of Alaska Planning Area, *14*

Cook Inlet Planning Area, *15*

Resource Estimates for the Alaska OCS Region, *15*

Atlantic OCS Region, *18*

Geology and Petroleum Potential of the Atlantic OCS Region, *18*

North Atlantic Planning Area, *18*

Mid-Atlantic Planning Area, *18*

South Atlantic Planning Area, *20*

Straits of Florida Planning Area, *21*

Resource Estimates for the Atlantic OCS Region, *21*

Gulf of Mexico OCS Region, *23*

Geology and Petroleum Potential of the Gulf of Mexico OCS Region, *23*

Eastern Gulf of Mexico Planning Area, *23*

Central Gulf of Mexico Planning Area, *26*

Western Gulf of Mexico Planning Area, *27*

Resource Estimates for the Gulf of Mexico OCS Region, *27*

Pacific OCS Region, *29*

Geology and Petroleum Potential of the Pacific OCS Region, *29*

Washington-Oregon Planning Area, *29*

Northern California Planning Area, *29*

Central California Planning Area, *31*

Southern California Planning Area, *31*

Resource Estimates for the Pacific OCS Region, *32*

continued

2. OCS OIL AND GAS LEASING PROGRAM, 35

- Lease Sale Process, **35**
- Five-Year OCS Oil and Gas Leasing Program, **35**
- OCS Advisory Board, **40**
 - OCS Policy Committee, **40**
 - OCS Scientific Committee, **40**
 - Regional and Technical Working Groups, **40**
- National Overview of OCS Leasing, **42**
- Regional Overviews of OCS Leasing, **44**
 - Alaska OCS Region, **44**
 - Atlantic OCS Region, **47**
 - Gulf of Mexico OCS Region, **49**
 - Pacific OCS Region, **54**
- Environmental Studies Program, **57**

3. POST LEASE ACTIVITIES ON THE OCS, 61

- Exploration Phase of Postlease Activities, **61**
 - Alaska OCS Region, **64**
 - Atlantic OCS Region, **70**
 - Gulf of Mexico OCS Region, **74**
 - Pacific OCS Region, **78**
- Development Phase of Postlease Activities, **81**
 - Alaska OCS Region, **81**
 - Atlantic OCS Region, **81**
 - Gulf of Mexico OCS Region, **81**
 - Pacific OCS Region, **88**
- Production Phase of Postlease Activities, **94**
 - Gulf of Mexico OCS Region, **95**
 - Pacific OCS Region, **99**

4. OIL AND GAS TRANSPORTATION AND ONSHORE SUPPORT FACILITIES, 103

- Oil and Gas Transportation, **103**
 - Port Access Route Studies, **103**
 - Regional Transportation Overviews, **104**
 - Alaska OCS Region, **104**
 - Atlantic OCS Region, **105**
 - Gulf of Mexico OCS Region, **106**
 - Pacific OCS Region, **108**
 - Onshore Support Facilities, **110**
 - Alaska OCS Region, **110**
 - Atlantic OCS Region, **110**
 - Gulf of Mexico OCS Region, **110**
 - Pacific OCS Region, **114**
 - Additional Readings, **114**
-

Contents

5. SPECIAL TOPICS RELATED TO THE OCS PROGRAM, 117

- Offshore Strategic and International Minerals Program, 117
- Coastal Zone Management Program, 118
- Coastal Zone Management Act Reauthorization, 118
- Rigs-to-Reefs Program, 119

APPENDIXES

- A. Geologic Reports Available from MMS, 123
- B. Bibliography of OCS Information Reports, 127

FIGURES

Introduction:

- I-1. Graph showing comparison of U.S. crude oil consumption, imports, and price, 1970 through September 1988, 2
- I-2. Chart showing sources of U.S. crude oil for 1960, 1970, 1980, and 1987, 3

Chapter 1:

- 1-1. Chart showing geologic time scale, 6
- 1-2. Graph showing geologic and geophysical permits approved by MMS, 1969 through September 1988, 7
- 1-3. Map showing Alaska OCS Region planning areas, basins, and depocenters, 9
- 1-4. Map showing Atlantic OCS Region planning areas, basins, and depocenters, 19
- 1-5. Map showing Gulf of Mexico OCS Region planning areas, basins, and depocenters, 24
- 1-6. Map showing Gulf of Mexico OCS Region planning areas and structural features, 25
- 1-7. Map showing Pacific OCS Region planning areas, basins, and depocenters, 30

Chapter 2:

- 2-1. Flowchart showing the prelease phase of the OCS oil and gas leasing process, 36
- 2-2. Graph showing acres leased under tract selection, areawide, and focused leasing programs, 1954 through September 1988, 37
- 2-3. July 1987 "Final 5-year OCS Oil and Gas Leasing Program" milestone schedule, 39
- 2-4. OCS Advisory Board structure, 41
- 2-5. Chart showing number of sales held, acres leased, and high bonus bids accepted by OCS region, 1954 through September 1988, 42
- 2-6. Chart showing active leases by OCS region as of September 30, 1988, 42
- 2-7. Graph showing comparison of oil price and high bonus bid accepted, 1954 through September 1988, 43
- 2-8. Chart showing top 10 Alaska OCS leaseholders by percentage of acreage held, September 1988, 46
- 2-9. Chart showing top 10 Atlantic OCS leaseholders by percentage of acreage held, September 1988, 49

continued

- 2-10. Chart showing top 10 Gulf of Mexico OCS leaseholders by percentage of acreage held, September 1988, **51**
- 2-11. Chart showing top 10 Pacific OCS leaseholders by percentage of acreage held, September 1988, **55**
- 2-12. Graph showing OCS Environmental Studies Program annual level of funding by OCS Region, 1973 through September 1988, **58**
- 2-13. Chart showing percentage of OCS Environmental Studies Program funds distributed by region, 1973 through September 1988, **59**
- 2-14. Chart showing expenditures by discipline for the OCS Environmental Studies Program, 1973 through September 1988, **60**

Chapter 3:

- 3-1. Flowchart showing postlease phase of the OCS oil and gas leasing process, **62**
- 3-2. Flowchart showing the Exploration Plan review process, **63**
- 3-3. Graph showing exploratory wells drilled on the OCS through September 1988, **64**
- 3-4. Graph showing exploratory wells drilled in the Alaska OCS Region by planning area through September 1988, **65**
- 3-5. Map showing Alaska OCS Region official protraction diagrams, **68**
- 3-6. Graph showing exploratory wells drilled in the Atlantic OCS Region by planning area through September 1988, **71**
- 3-7. Map showing Atlantic OCS Region official protraction diagrams, **73**
- 3-8. Chart showing total exploratory wells drilled in the Gulf of Mexico OCS Region by planning area through September 1988, **74**
- 3-9. Graph showing exploratory wells drilled in the Pacific OCS Region by planning area, 1963 through September 1988, **78**
- 3-10. Map showing Pacific OCS Region official protraction diagrams and leasing maps, **80**
- 3-11. Flowchart showing the Development and Production Plan review process, **82**
- 3-12. Chart showing development plans approved in the Gulf of Mexico OCS Region by planning area, 1983 through September 1988, **83**
- 3-13. Graph showing total number of development wells drilled in the Gulf of Mexico OCS Region by planning area through September 1988, **83**
- 3-14. Map showing Gulf of Mexico OCS Region official protraction diagrams, **85**
- 3-15. Map showing Gulf of Mexico OCS Region leasing maps, **86**
- 3-16. Graph showing total number of development wells drilled in the Pacific OCS Region through September 1988, **88**
- 3-17. Graph showing Federal offshore crude oil and condensate production through 1987, **94**
- 3-18. Graph showing Federal offshore crude oil and condensate production as a percentage of total U.S. production through 1987, **94**
- 3-19. Chart showing top 10 producers by percentage of oil and condensate from the Federal OCS for 1987, **94**
- 3-20. Graph showing Federal offshore natural gas production through 1987, **95**
- 3-21. Graph showing Federal offshore natural gas production as a percentage of the total U.S. production through 1987, **95**
- 3-22. Chart showing top 10 producers by percentage of natural gas from the Offshore OCS waters for 1987, **95**
- 3-23. Graph showing national OCS oil and condensate production from 1954 to 1987 and relative amounts produced in the Gulf of Mexico and the Pacific OCS Regions, **96**

Contents

Chapter 3: continued

- 3-24. Graph showing national OCS gas production from 1954 to 1987 and relative amounts produced from the Gulf of Mexico and Pacific OCS Regions, **96**
- 3-25. Graph showing crude oil and condensate production in the Gulf of Mexico OCS Region through 1987, **97**
- 3-26. Graph showing natural gas production in the Gulf of Mexico OCS Region through 1987, **97**
- 3-27. Graph showing crude oil production in the Pacific OCS Region, 1968-1987, **100**
- 3-28. Graph showing natural gas production in the Pacific OCS Region, 1968-1987, **100**
- 3-29. Map showing recognized discoveries of federally controlled oil and gas fields in the Pacific OCS Region, **102**

Chapter 4:

- 4-1. Graph showing pipeline projects approved by MMS and total mileage, 1983 through September 1988, **107**
- 4-2. Graph showing offshore pipeline construction from sites originating in the Pacific OCS Region through September 1988, **108**
- 4-3. Graph showing design capacity, throughput, and number of shut-down Gulf of Mexico coastal oil refineries, by State, as of December 1987, **113**
- 4-4. Graph showing Gulf of Mexico regional area gas processing capacity and throughput compared with all other States as of December 1987, **113**

Chapter 5:

- 5-1. Graph showing yearly installations and removals of offshore production platforms on the Gulf of Mexico OCS, 1953 through September 1988, **121**

TABLES

Chapter 1:

- 1-1. COST wells drilled on the Alaska OCS, **12**
- 1-2. Estimates of undiscovered economically recoverable oil and gas resources in the Alaska OCS Region as of January 1987, **16**
- 1-3. COST wells drilled on the Atlantic OCS, **20**
- 1-4. Estimates of undiscovered economically recoverable oil and gas resources in the Atlantic OCS Region as of January 1987, **22**
- 1-5. COST wells drilled on the Gulf of Mexico OCS, **26**
- 1-6. Estimates of undiscovered economically recoverable oil and gas resources in the Gulf of Mexico OCS Region as of January 1987, **28**
- 1-7. COST wells drilled on the Pacific OCS, **32**
- 1-8. Estimates of undiscovered economically recoverable oil and gas resources in the Pacific OCS Region as of January 1987, **33**

Chapter 2:

- 2-1. Lease sale history of the Alaska OCS Region through September 1988, **44**
- 2-2. Dates of and Federal Register notices for significant prelease steps for Alaska OCS lease sales through September 1988, **45**

continued

- 2-3. Lease sale history of the Atlantic OCS Region through September 1988, **47**
- 2-4. Dates of and Federal Register notices for significant prelease steps for Atlantic OCS lease sales through September 1988, **48**
- 2-5. Lease sale history of the Gulf of Mexico OCS Region through September 1988, **50**
- 2-6. Dates of and Federal Register notices for significant prelease steps for Gulf of Mexico OCS lease sales, January 1980 through September 1988, **53**
- 2-7. Lease sale history of the Pacific OCS Region through September 1988, **54**
- 2-8. Dates of and Federal Register notices for significant prelease steps for Pacific OCS lease sales through September 1988, **56**

Chapter 3:

- 3-1. Exploratory wells drilled in the Alaska OCS Region through September 1988, **66**
- 3-2. Exploratory wells drilled in the Atlantic OCS Region through September 1988, **72**
- 3-3. Exploratory wells drilled in the Gulf of Mexico OCS Region by planning area through September 1988, **75**
- 3-4. Deep-water drilling activity in the Gulf of Mexico OCS Region from March 1986 through September 1988, **76**
- 3-5. Exploratory wells drilled in the Eastern Gulf of Mexico OCS Planning Area as of September 1988, **77**
- 3-6. Exploratory wells drilled in the Pacific OCS Region by OPD location through September 1988, **79**
- 3-7. Total number of development wells drilled in the Gulf of Mexico OCS Region by OPD location through September 1988, **84**
- 3-8. Selected Gulf of Mexico OCS Region deep-water projects as of September 1988, **87**
- 3-9. Existing platforms and development wells spudded in the Pacific OCS Region through September 1988, **89**
- 3-10. Platforms proposed to be installed in the Pacific OCS Region as of September 1988, **93**
- 3-11. Estimated demonstrated oil and gas reserves and cumulative production for the Gulf of Mexico OCS Region, December 31, 1987, **98**
- 3-12. Pacific OCS Region's contribution to national production, 1968-1987, **99**
- 3-13. Estimated demonstrated oil and gas reserves and cumulative production for the Pacific OCS Region, 1981-1987, **101**

Chapter 4:

- 4-1. Transportation scenarios for hydrocarbons produced from Alaska OCS planning areas, **105**
- 4-2. Existing and proposed OCS pipelines offshore California as of September 1988, **109**
- 4-3. Actual or potential Alaska OCS Region support facilities, **111**
- 4-4. Pacific Coast active refineries and their operable atmospheric crude oil distillation capacity on January 1, 1985, 1986, and 1987, **115**

Chapter 5:

- 5-1. Existing and permitted rigs-to-reefs projects on the Gulf of Mexico OCS through September 1988, **120**

Introduction

Purpose of the Compendium

The Minerals Management Service's (MMS) Outer Continental Shelf Information Program (OCSIP) is responsible for making available to affected coastal States, local governments, and other interested parties data and information related to the Outer Continental Shelf (OCS) oil and gas leasing, exploration, and development activities as mandated by the OCS Lands Act (OCSLA) Amendments of 1978. Since its establishment, OCSIP has coordinated the preparation of regional summary reports, updates, and indexes to fulfill the mandates of the OCSLA Amendments.

The OCSIP receives many requests for the entire series of summary reports, updates, and indexes, some of which are out of print. The purpose of the National Compendium is to consolidate these historical data and present the data on an OCS-wide and regional scale. (Because of the number and different types of data presented in this document, updating every table and graph through 1988 was not feasible.) The single volume approach allows the reader access to historical information and facilitates regional comparisons. A predominantly graphical format was used so that the large accumulation of data could be more readily comprehended.

History of the OCS Oil and Gas Program

Offshore oil and gas production dates back to 1897 with the drilling of wells from a pier at Summerland, California. Gradually from the turn of the century to the mid-1930's offshore oil development grew substantially, and technological capabilities reached the stage where the prospects for offshore oil were generating widespread interest. This increased interest, coupled with rapid technological advancements, led to conflicting jurisdictional claims by individual States and the Federal Government. The Truman Proclamations of 1945 sought to alleviate these conflicts by asserting U.S. jurisdiction and control over the natural resources of the continental shelf contiguous to the United States.

The Department of the Interior's (DOI) OCS Oil and Gas Program began with the passage of the OCS Lands Act of 1953. The act provided for the jurisdiction of the United States over the submerged lands of the Outer Continental Shelf and authorized the Secretary of the Interior to lease such lands for certain purposes.

Shortly after the passage of the Act, the first OCS lease sale was held in the Gulf of Mexico on October 13, 1954. The DOI leased 90 tracts and collected over \$116 million in bonuses. Since that time, the DOI, through both the Bureau of Land Management and the MMS, has held 96 lease sales and has collected over \$54 billion in bonuses.

In 1978, amendments to the OCS Lands Act were enacted to require that before offshore activities could begin, the Secretary of the Interior would consider the potential for (1) any environmental impacts, (2) the discovery of oil or gas, and (3) the adverse effects on the coastal zone. (See the "Additional Readings" section on page 3 for more information related to the OCS Lands Act and its amendments.) Since enactment of the amendments, the Secretary of the Interior has implemented three 5-year leasing programs. The 5-year program is discussed in more detail in chapter 2.

Since 1980, the price of oil has declined, with the price decreasing by half between 1985 and 1986. Prices since 1986 have stabilized in the \$14-\$16 per barrel range. From 1980 to 1983, imports of oil, as well as U.S. consumption of oil, decreased. In 1986, they both began a gradual climb (see fig. I-1 on the next page). The OCS Program has felt the swings in both price and imports. The lower price has reduced interest in offshore exploration, whereas the increase in imports and consumption has increased the need to find more domestic reserves.

Importance of the OCS Oil and Gas Program

The importance of the OCS Oil and Gas Program can be seen in a number of areas. First, the Program has helped to reduce the amount of oil the United States needs to import for domestic consumption.

2 OCS National Compendium

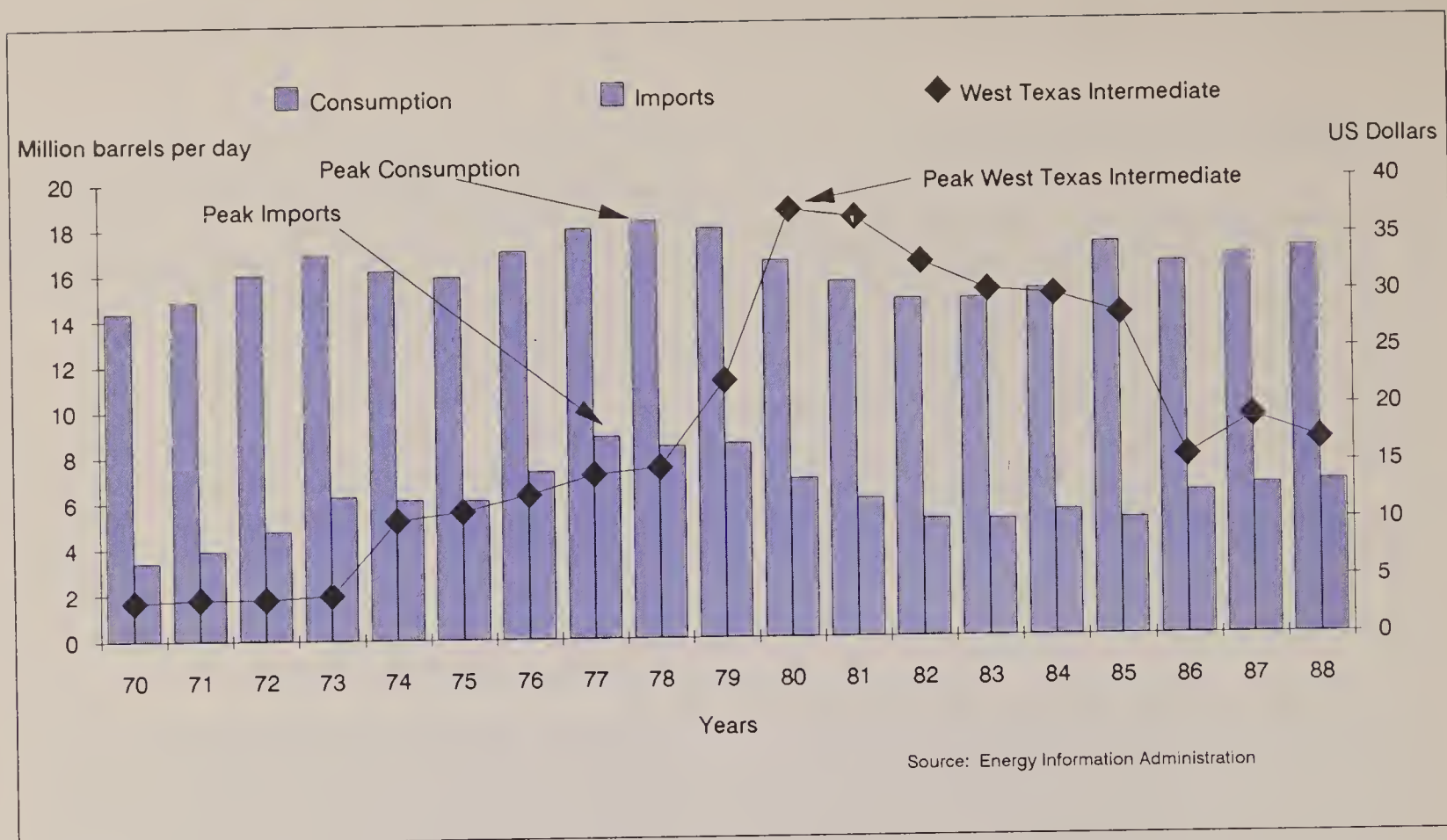


Figure I-1. Comparison of U.S. crude oil consumption, imports, and price, 1970 through September 1988.

Figure I-2 shows how much the U.S. offshore production contributed to the U.S. supply of crude oil for the years 1960, 1970, 1980, and 1987.

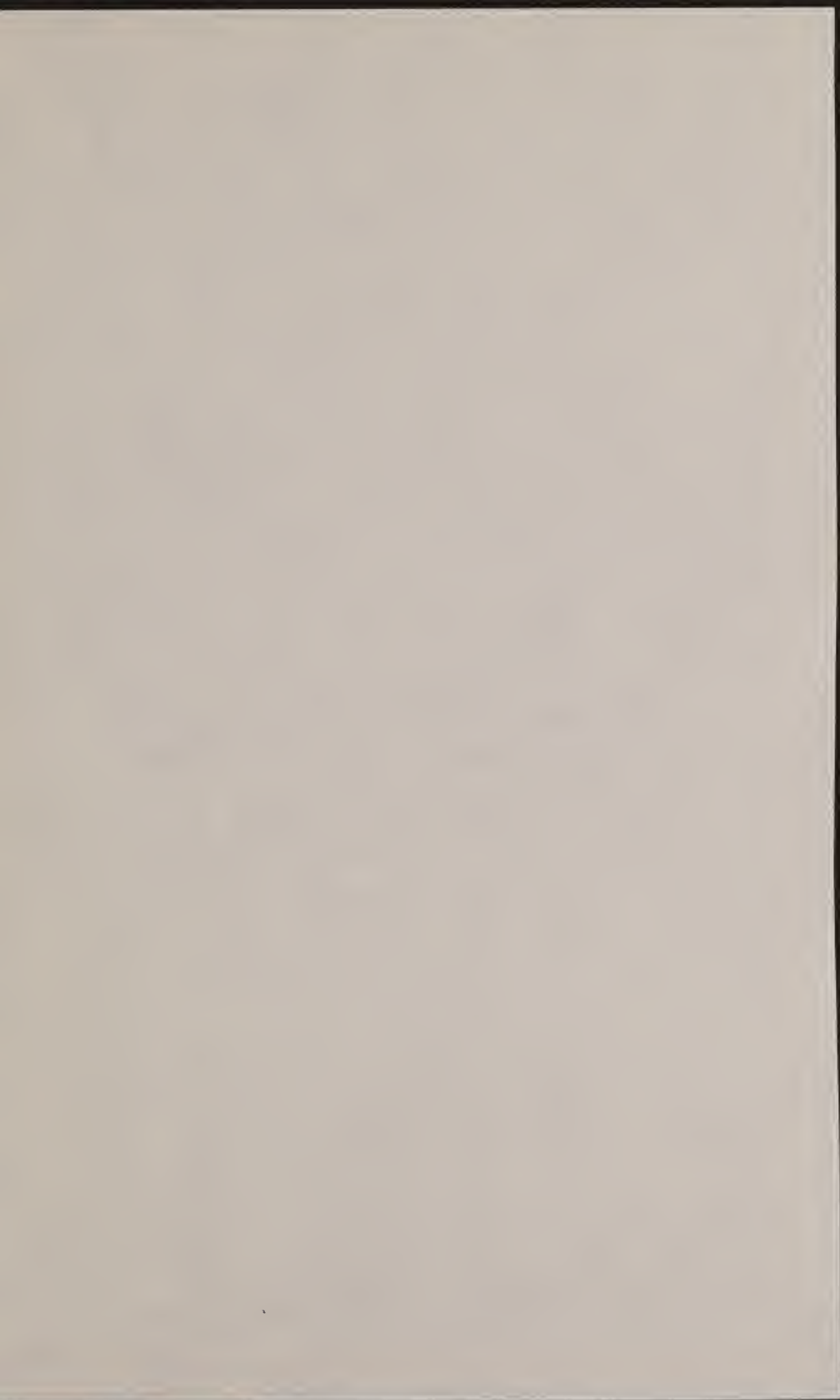
The offshore contribution has helped to stabilize the domestic energy supply. From 1960 through 1987, U.S. onshore oil production has steadily declined from 76 percent to 48 percent of the total U.S. supply of crude oil. During this decline, the offshore production has allowed the U.S. imported supply of crude oil to remain below 50 percent. As seen on the chart (fig. I-2, p. 3), removing the offshore contribution in 1980 and 1987 would have increased the amount of imported crude oil to greater than 50 percent. To put this number in perspective, in 1973 (the year of the oil embargo) imports were 42 percent.

Federal OCS natural gas production has also served to stabilize the domestic energy supply. Since 1978, over 20 percent of the total U.S. production of natural gas has come from Federal OCS leases, with 1987 reaching a new high, accounting for over 25 percent of the total domestic production of natural gas.

As of January 1, 1987, the total estimated recoverable reserves in the submerged Federal lands amounted to 5.2 billion barrels of crude oil and 47.9 trillion cubic feet of natural gas. In addition, the potential for future discoveries on the OCS is still significant. Further development of offshore oil and gas could help to reduce the need for these imported products. Decreasing the amount of imported oil and gas would lessen the overall U.S. trade deficit, which would then help to strengthen the U.S. economy.

Second, the OCS Oil and Gas Program provides a great source of national wealth and employment. As of September 1988, the Program has generated over \$89 billion in revenues for the United States. In addition to the revenues collected, OCS oil and gas produced in the United States helps to increase the Nation's overall economic productivity.

The OCS Oil and Gas Program supports the U.S. economy in other ways as well. As the offshore program expands, materials are needed from all parts of the country for the exploration, development, and production of oil and gas. Jobs are created and revenue is generated throughout the United States.



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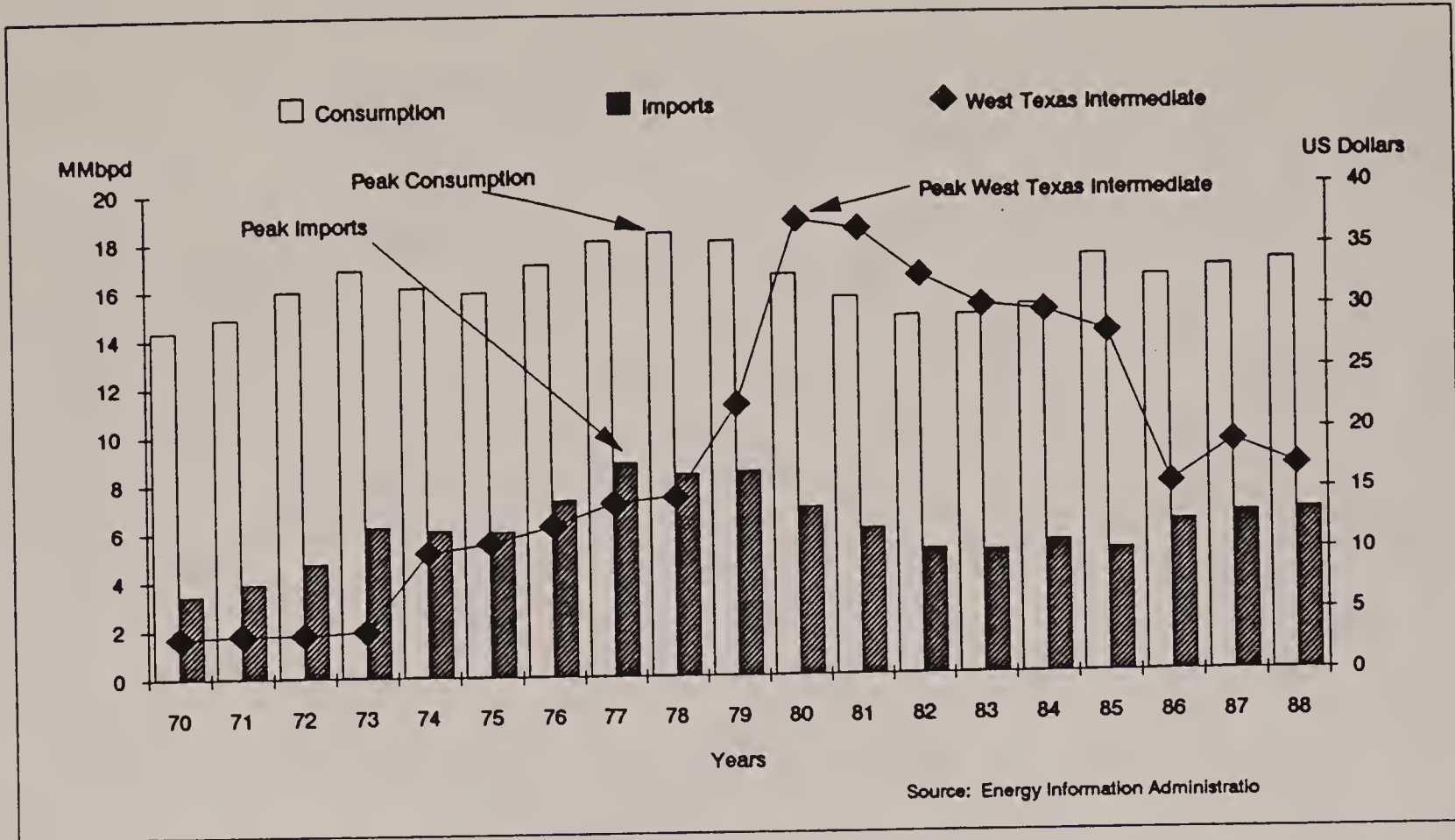


Figure I-1. Comparison of U.S. crude oil consumption, imports, and price, 1970 through September 1988.

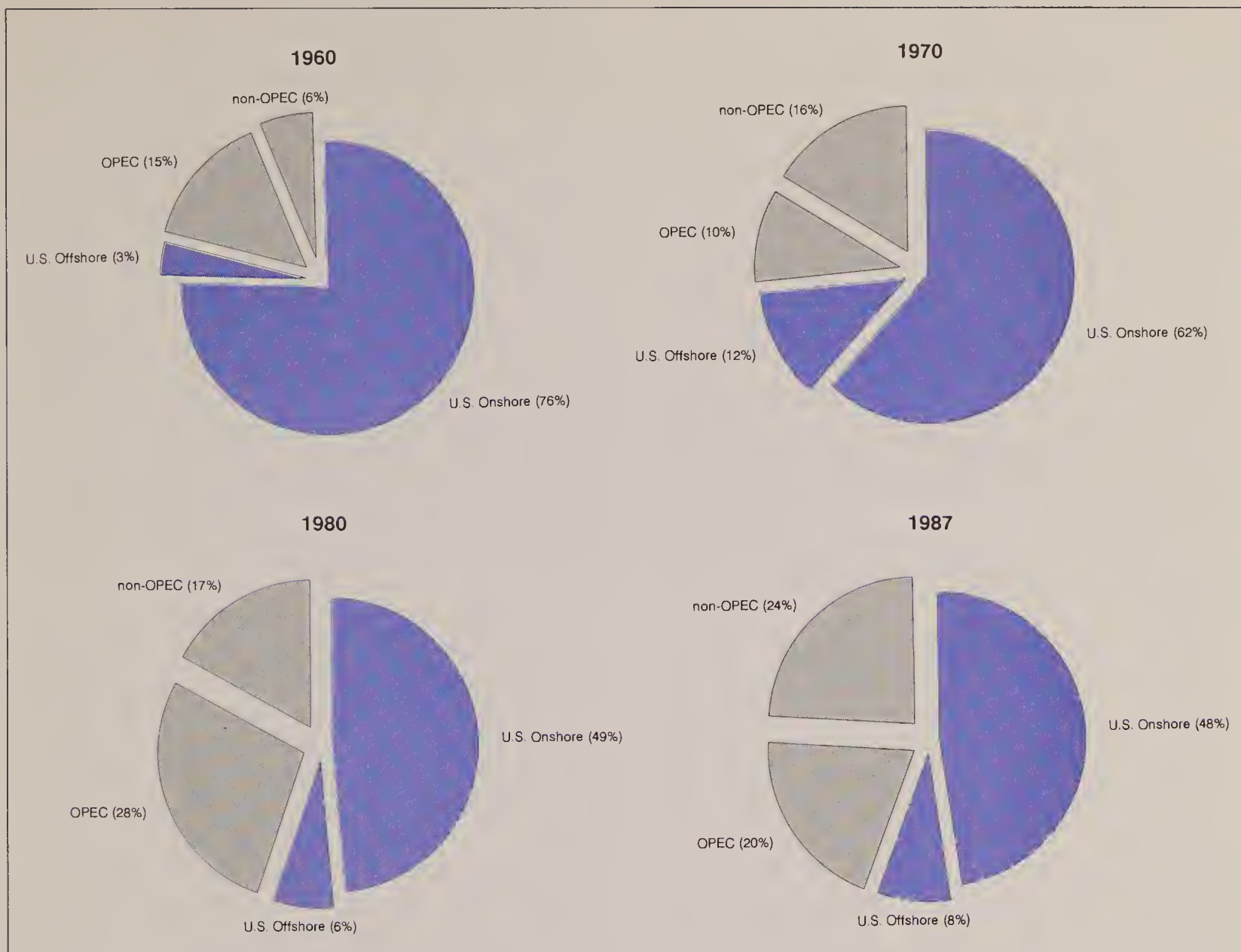


Figure I-2. Sources of U.S. crude oil for 1960, 1970, 1980, and 1987.

Compendium Organization

This is the second National Compendium produced under the auspices of OCSIP. It parallels, to some extent, the organization of the OCSIP's regional summary reports and updates. **Chapter 1** describes the geology and discusses the petroleum potential for each of the OCS planning areas. **Chapter 2** focuses on the leasing process and summarizes each of the previous 5-Year OCS Oil and Gas Leasing Programs, it also discusses the present 5-Year OCS Oil and Gas Leasing Program. **Chapter 3** addresses the postlease activities on the OCS as they relate to exploration, development, and production. **Chapter 4** includes information concerning offshore transportation and provides a summary of the onshore facilities that support offshore oil and gas operations. **Chapter 5** presents information on

special topics that relate to the OCS Oil and Gas Program. This report also contains two appendixes.

Appendix A is a list of geologic reports available from MMS. **Appendix B** is a bibliography of OCSIP publications and other relevant MMS documents.

Additional Readings

- Hollick, A.L. 1981. *U.S. Foreign Policy and the Law of the Sea*. Princeton Univ. Press, Princeton, NJ. 496 p.
- Krueger, R.B. 1978. *State Tidelands Leasing in California: UCLA Law Review*. UCLA Press. Vol. 5, No. 3, p. 427-489.
- Minerals Management Service. April, 1987. *5-Year Leasing Program Mid-1987 to Mid-1992*.
- Sholowitz, Aaron. 1978. *Shore and Sea Boundaries*. U.S. Government Printing Office. Vol. 1.

1. OCS Regional Geology, Petroleum Potential, and Resource Estimates

This chapter summarizes the geology and petroleum potential, and the resource and reserve estimates, for 21 of the 26 planning areas within the four Outer Continental Shelf (OCS) regions designated under the current Federal 5-year OCS Oil and Gas Leasing Program. Five of the 26 planning areas are not discussed in this report because no sales were scheduled for these areas under the current 5-year leasing program. These planning areas are Kodiak, St. Matthew Hall, Aleutian Basin, Bowers Basin, and Aleutian Arc. The Cook Inlet and the Gulf of Alaska Planning Areas are discussed separately; however, for lease sale purposes, these areas have been combined.

The geologic summaries for the 21 planning areas were prepared from previous OCSIP regional summary reports, regional lease sale environmental impact statements (EIS's), and the final EIS for the Proposed 5-Year OCS Oil and Gas Leasing Program, mid-1987 to mid-1992. (Appendix A lists the geologic reports currently available through the MMS. Please refer to these reports for additional geologic information.) A generalized geologic time scale (fig. 1-1) is included for reference. The discussions on regional petroleum potential were based on OCS Report MMS 86-0048, *United States Outer Continental Shelf Basins: Maps & Descriptions*, George Dellagiarino, Editor.

<i>Era</i>	<i>Period</i>	<i>Epoch</i>	<i>Years before present</i>
Cenozoic	Quaternary	Holocene (Recent)	
			11,000
		Pleistocene (Glacial)	
			500,000-2,000,000
	Tertiary	Pliocene	13,000,000
		Miocene	25,000,000
		Oligocene	36,000,000
		Eocene	58,900,000
		Paleocene	63,000,000
Mesozoic	Cretaceous		135,000,000
	Jurassic		180,000,000
	Triassic		230,000,000
	Permian		280,000,000
Paleozoic	Pennsylvanian (Upper Carboniferous)		310,000,000
	Mississippian (Lower Carboniferous)		345,000,000
	Devonian		405,000,000
	Silurian		425,000,000
	Ordovician		500,000,000
	Cambrian		600,000,000
Precambrian			

Figure 1-1. Geologic time scale.

The MMS resource estimates for each of the OCS planning areas are based, in part, on data from industry exploratory and development operations performed under permits or mineral leases issued for the Federal OCS. Figure 1-2 on the next page shows the number of geologic and geophysical permits approved by MMS from 1969 through September 1988. (See Geologic and Geophysical Permit Data sidebar for additional information.) These data were used to identify and map specific offshore prospects and also to extrapolate potential prospects where data gaps exist. Economic parameters were developed to incorporate oil and natural gas prices, development, production, and transportation costs, and future predictions for these and other economic factors that may influence industry's development activities. Estimates of undiscovered economically recoverable oil and gas resources were developed using a computer mathematical simulation model, Probabilistic Resource Estimates-Offshore, or PRESTO. (For a description of this model, see OCS Report MMS 85-0012, *Estimates of Undiscovered, Economically Recoverable Oil and Gas Resources for the Outer Continental Shelf as of July 1984* by Larry W. Cooke.)

Geologic and Geophysical Permit Data

The OCS Lands Act (43 U.S.C. 1331 et seq.), as amended, authorizes the Secretary of the Interior to prescribe rules and regulations necessary to carry out the provision of the Act. Title 30, part 251, of the Code of Federal Regulations (CFR) contains the regulations regarding acquisition of geological and geophysical (G&G) information on the Outer Continental Shelf. The MMS administers data acquisition through these regulations. The purpose of these regulations is to prescribe (1) when a permit or the filing of a notice is required to conduct G&G exploration on the OCS, as well as the operating procedures for conducting exploration, (2) how to disclose the data and information, and (3) what the conditions are for reimbursement of certain costs.

In February of 1988, the MMS published a final rule, (to become effective March 1988), that revised the timeframes for protection of proprietary G&G data and information collected under an MMS permit. The terms of protection increased from 10 years to 25 years for geophysical information (the most common acquisition by MMS from industry) and from 10 years to 50 years for geophysical data. In addition, the maximum protection for G&G information from a deep stratigraphic test well, in the absence of a lease being issued within 50 miles of the test well, has been increased from 10 years to 25 years. The purpose of this rule is to protect the collector of the data and information from loss of the commercial value of the data and information. The 25-year period of protection for geophysical information, in most cases, provides for several lease sales in a planning area and allows the permittee repeated use of the information. The new term also considers the fact that for various reasons, certain portions of a planning area may be unavailable for leasing.

The Gulf of Mexico OCS Region has approved far more permits than any of the other regions. However, the number of G&G permits has decreased since 1983. This is due in part to the recent drop in world oil prices and the fact that industry has shifted its interest from exploration to development.

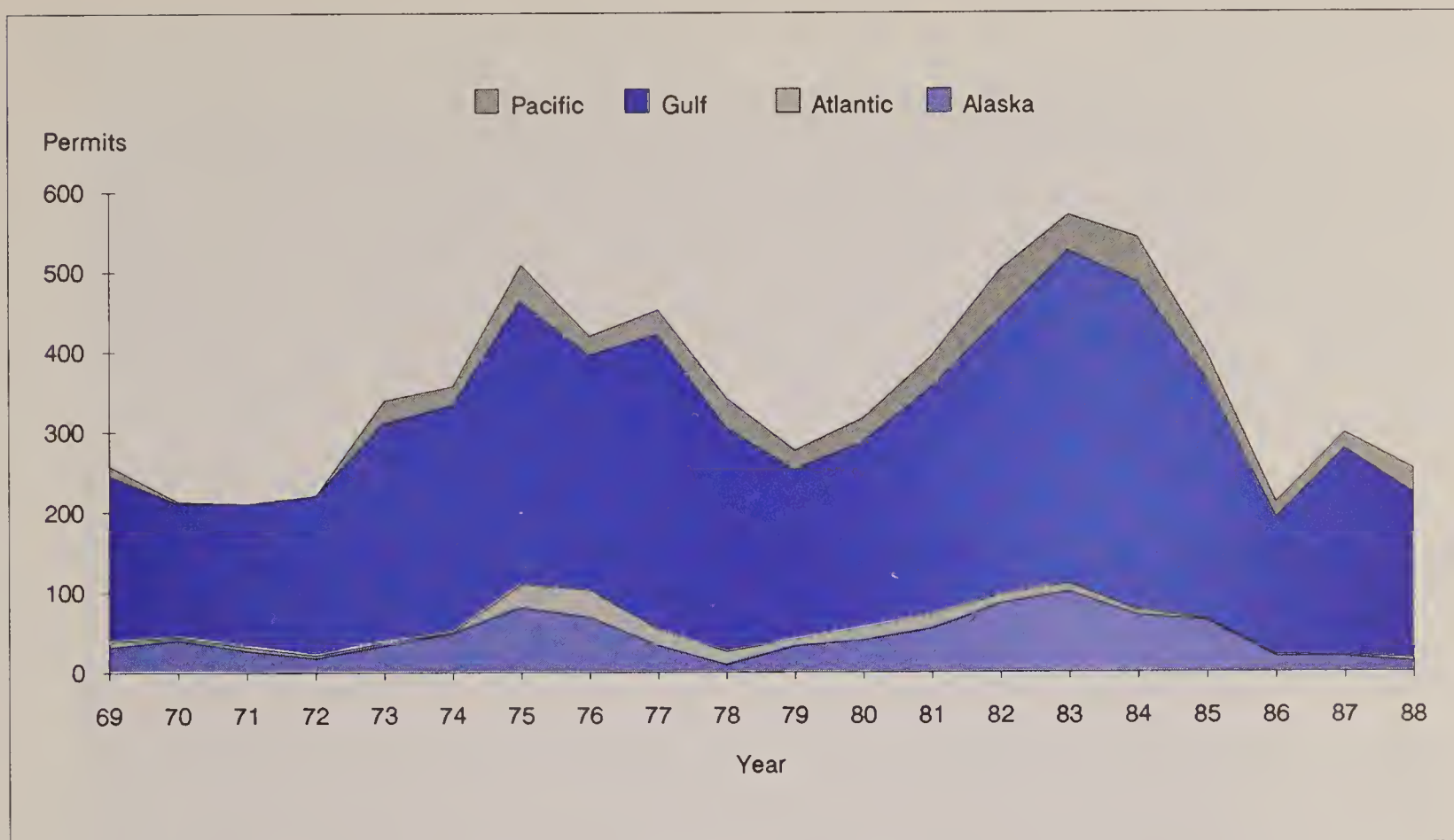


Figure 1-2. *Geologic and geophysical permits approved by MMS, 1969 through September 1988.*

Alaska OCS Region

The Alaska OCS Region is divided into 15 planning areas for the purpose of OCS oil and gas leasing. These areas as well as the Alaska OCS Region basins and depocenters are depicted in figure 1-3 on the next page. Please refer to this figure as you read through this section. Five of these planning areas will not have lease sales under the current 5-Year OCS Oil and Gas Leasing Program, and will not be described below.

GEOLOGY AND PETROLEUM POTENTIAL OF THE ALASKA OCS REGION

Beaufort Sea Planning Area

Geology.--The Beaufort Sea Planning Area can be divided into two sections of contrasting geologic structure and stratigraphy. The highly faulted boundary between these two provinces is termed the Hinge Line. The western section, which extends from Point Barrow to approximately 145° W. longitude, is characterized by the Barrow Arch and a thick continental terrace consisting of Lower Cretaceous to Tertiary clastic sediments. The eastern sector, from 145° W. longitude to the Canadian border, is dominated by two anticlines and an intervening syncline developed in late Cenozoic sedimentary rocks. The shelf area is underlain by sedimentary rocks. The major physiographic provinces within this area include the Arctic Platform, the Northeast Chukchi Basin, the Dinkum Graben, the Nuwuk Basin, the Kaktovik Basin, and the Arctic Basin.

Petroleum Potential.--Exploration for hydrocarbons in this area has been conducted since 1944, when the Department of the Navy began drilling exploratory tests at several localities in the central and northernmost parts of the Arctic coastal plain. This work led to the discovery of several noncommercial oil and gas fields. Privately funded exploration elsewhere on the coastal plain led to the discovery of the supergiant Prudhoe Bay field in 1968. This field contains remaining recoverable reserves in excess of 5 billion barrels of oil (original reserves, 10 Bbbl) and 26 trillion cubic feet of gas. It sparked oil development in northern Alaska and afforded construction of an essential pipeline transportation system from the field to an ice-free port in southern Alaska. Because of

the existence of this infrastructure, satellite accumulations in the vicinity of Prudhoe Bay, which would otherwise be considered subcommercial (ranging from 0.3 to 1.0 Bbbl), are now being brought into production. Drilling offshore in Federal waters began in 1981. The Sea Island discovery, 12 miles (20 km) northwest of Prudhoe Bay, was announced by Shell in early 1984, and it appears to extend from State into Federal waters. Total recoverable reserves in the Seal Island structure are presently estimated at 300 million barrels of oil.

All major North Slope oil accumulations are lodged in Ellesmerian sequence reservoir formations, and any part of the Arctic Platform where these rocks are preserved is considered highly prospective. Known accumulations are trapped by a complex composite of sealing surfaces, including faults, structural dip, and truncation at regional unconformities such as that associated with the major Lower Cretaceous erosional event. The northernmost parts of the Arctic Platform are less prospective because of the absence of Ellesmerian formations, but they contain rift zone grabens within which reservoir rocks deposited as part of the rift sequence may be present. Excellent oil source beds are thought to be present at levels of thermal maturity adequate for oil generation and expulsion in all parts of the Beaufort continental shelf within the planning area.

Numerous structural and stratigraphic traps exist within the thick Brookian clastic wedge seaward of the Hinge Line. Any potential reservoir formations in this area were most likely deposited in a deltaic or prodeltaic setting, suggesting that individual accumulations may be small because of reservoir lenticularity. This situation has been commonly, but not universally, found to be the case in analogous geological provinces, such as the Mackenzie Delta area of the Canadian Beaufort shelf. Rotational folds associated with listric faulting are the most attractive targets in the Nuwuk Basin, whereas compressional folds and fault traps form the most prevalent trap types in the Kaktovik Basin.

Chukchi Sea Planning Area

Geology.--The Chukchi Sea Planning Area overlies the continental shelf of the northwestern Chukchi Sea and contains three stratigraphic basins: the North Chukchi Basin, the Colville (Hanna) Trough, and the Northern Hope Basin. This part of the shelf is broad

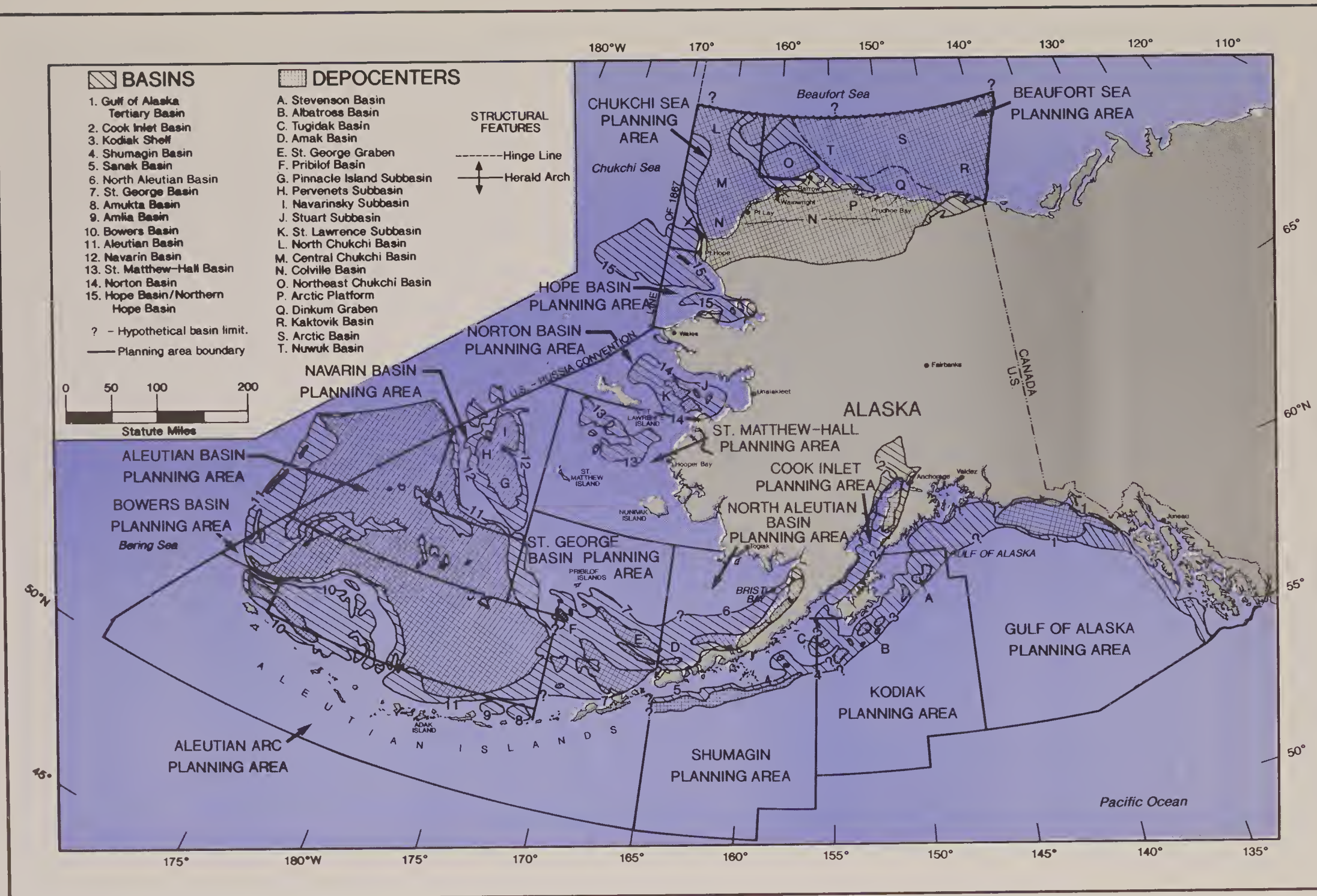


Figure 1-3. Alaska OCS Region planning areas, basins, and depocenters.

10 OCS National Compendium

and relatively flat; water depths generally range from about 10 to 50 meters (33-165 ft). A thick section that may exceed 40,000 feet (12,200 m) of sedimentary rocks underlies most of the planning area. The rocks range in age from Devonian or Mississippian to Tertiary and include a number of formations where oil and gas reservoirs or strong shows of oil and gas have been found on the North Slope of Alaska. The Chukchi Sea Planning Area also contains diverse geologic structures and stratigraphic features that may contain trapped hydrocarbon fluids.

Petroleum Potential.--Although industry has exhibited considerable interest in the past few years, no wells have been drilled in the Chukchi Sea. Therefore, it is necessary to extrapolate stratigraphic relationships into the planning area from existing geological and geophysical data that have been acquired in the adjacent National Petroleum Reserve in Alaska (NPRA). Exploration efforts in the NPRA began in 1904 with surface geologic exploration, and they continue at present. No commercial oil or gas fields have been discovered. Geologic data obtained from wells in the western NPRA were used to delineate potential source and reservoir rocks in the Chukchi Sea Planning Area.

On the basis of their high organic carbon content and high percentage of oil-prone kerogen, the best potential source rocks in the western NPRA and in the Hanna Trough appear to be the Shublik Formation and the Kingak Shale of the Ellesmerian sequence, as well as the Pebble Shale of the Brookian sequence. Vitrinite reflectance values indicate that these rocks increase in thermal maturity and lie below the oil window.

The most prospective reservoirs in the planning area would appear to be the Lisburne Group, the Sadlerochit Group, and the Endicott Group, all of which are oil productive or potentially productive in the Prudhoe Bay area. Sandstones, which occur at the base of the Pebble Shale, also form potential reservoirs in the northwestern NPRA and in the nearby Chukchi shelf area.

Both structural and stratigraphic traps are present in the planning area. Structural traps predominate in the Hanna Trough, the North Chukchi Basin, the Fold and Thrust Belt, the Hanna Wrench Zone, and the Northern Hope Basin. Stratigraphic traps may predominate on the flanks of the Arctic Platform and

the Chukchi Platform areas, but they are difficult to identify on seismic data without well control.

The areas with the highest hydrocarbon potential appear to be the northeastern and western portions of the planning area: the North Chukchi Basin, the Hanna Trough, and the flanks of the Arctic and Chukchi Platforms.

Hope Basin Planning Area

Geology.--The Hope Basin Planning Area overlies the continental shelf of the southeastern Chukchi Sea. This part of the shelf is relatively flat, and water depths within the planning area range from about 10 to 60 meters (33-197 ft). Studies conducted to date indicate a thick section of Tertiary and Cretaceous rocks possibly exceeding 17,000 feet (5,180 m), overlying the acoustic basement, with extensive faulting, which may provide possible traps. Rocks from terrestrial outcrops adjacent to the basin suggest that Hope Basin is filled by nonmarine and shallow-water marine sediments.

Petroleum Potential.--In 1974 and 1975, two onshore stratigraphic test wells, the Nimiuk Point No. 1 and the Cape Espenberg No. 1 wells, were drilled by Standard Oil of California, north and south of the entrance to Kotzebue Sound, just east of the planning area.

The Kotzebue Sound wells penetrated from 3,500 to 4,000 feet (1,070 to 1,220 m) of Quaternary sediments and from 2,500 to 4,000 feet (760 to 1,220 m) of Tertiary rocks that lie on Devonian or older metasedimentary basement. The rocks in these wells show excellent reservoir properties with an average sand content for the total section of over 50 percent and average porosities of over 25 percent. However, these rocks are part of the slightly younger Kotzebue Basin, which is separated from Hope Basin by the Kotzebue Arch, and may not represent the older, deeper offshore basin.

Many structural, stratigraphic, and fault traps may exist in the basin on the crest of, or adjacent to, the basement horst blocks. However, because of poor potential for source rocks in the pre-Tertiary basement and the generally thin, thermally immature Tertiary sedimentary section, the prospect for oil accumulation is low, with the possible exception of traps adjacent to locally thicker sections.

Norton Basin Planning Area

Geology.--The entire Norton Basin Planning Area overlies the continental shelf of the northeastern Bering Sea. This shelf is characterized as being broad and shallow; water depths within the planning area generally range from about 5 to 55 meters (16-181 ft). The potential source and reservoir rocks of the Norton Basin would most likely be Tertiary in age and would overlie the Cretaceous and older basement rocks. The Paleocene rocks are the most promising for petroleum. The thick section of sedimentary rocks, approaching 14,000 feet (4,270 m) in many parts of the Norton Basin, could provide the source rocks, migration routes, and stratigraphic traps for petroleum. The fault-dominated structure of the basin rocks also may have produced structural traps. The arch-like structure of the strata overlying structural highs also may provide potential traps for hydrocarbon fluids.

Petroleum Potential.--Exploration began in Norton Basin with the drilling of two Continental Offshore Stratigraphic Test (COST) wells in 1980 and 1982. (See table 1-1 on the next page for a detailed listing of COST wells drilled on the Alaska OCS.) The COST No. 2 well encountered shows of gas below a depth of 12,000 feet (3,650 m). A total of six exploratory wells were completed in 1984 and 1985.

Anticlines, faulted anticlines, fault traps, and stratigraphic pinch-outs are present in the Norton Basin. Faults and unconformities are present to provide migration routes. The major problem facing Norton Basin hydrocarbon production is having a sufficient amount of source rocks with the proper kerogen.

Stratigraphic test well data indicated that sufficient maturity for oil exists below 9,500 feet (2,900 meters) in the western subbasin and 10,600 feet (3,230 meters) in the eastern subbasin. Dry gas and wet gas condensate are most likely present. Below 13,000 feet (3,960 meters), there is insufficient organic carbon to serve as a commercial hydrocarbon source. Sandstone porosities of greater than 13 percent and permeabilities of 1 millidarcy are restricted to depths less than 9,000 feet (2,700 meters) (mid-Oligocene or younger) in the eastern subbasin. Sandstone porosities of greater than 24 percent and permeabilities of 1 millidarcy are restricted to depths less than 6,000 feet (1,830 meters) (late Oligocene or younger) in the western subbasin.

Navarin Basin Planning Area

Geology.--The Navarin Basin Planning Area consists of three physiographic provinces: (1) the relatively flat continental shelf, which extends to the 150-meter isobath; (2) the steep continental slope, which lies between the 150- and 2,800-meter isobath; and (3) the continental rise, which extends from the base of the slope to depths greater than 3,000 meters (9,843 ft). The planning area includes three basins separated by basement ridges that trend northwest. The largest basin, which is adjacent to the U.S.-U.S.S.R. Convention Line of 1867 in the northern part of the planning area, contains a section of sedimentary rocks that is approximately 7 to 9 miles (12-15 km) thick; the sedimentary section in each of the other two basins is thinner.

Petroleum Potential.--Exploration in the Navarin Basin began in 1983 with the drilling of the Navarin Basin COST No. 1 well. Eight exploratory wells have been drilled, all in 1985.

Stratigraphic test well data indicate the late Eocene and early Oligocene mudstones to be the most favorable source rocks in the Navarin Basin. This stratigraphic sequence thickens in the deeper parts of the subbasins, thus possibly providing significant amounts of oil-prone rocks at a favorable level of thermal maturity. Possible reservoir rocks are Oligocene sandy mudstones, basal sands deposited by the early Tertiary transgression over the Mesozoic basement rocks, and coarse-grained deposits flanking basement highs that were deposited during sea-level lowerings in the Oligocene and Miocene. Traps found in the basin include anticlines, faulted anticlines, fault traps, and stratigraphic pinch-outs. Many traps are adjacent to the potential source rocks; however, traps that are not adjacent may be fed by hydrocarbon migration along unconformities and faults and through permeable strata. Timing of trap formations and oil generation may produce an important obstacle to oil accumulation in the basin.

St. George Basin Planning Area

Geology.--The Bering Shelf is described as a broad continental platform that is underlain by deformed Mesozoic and Cenozoic rocks. As a result of uplift before the end of the Mesozoic era, followed by extensive rifting and regional subsidence, a series of basement ridges and basins, such as the St. George

Table 1-1. COST wells drilled on the Alaska OCS

Planning area/ well number	Lease/block number	Operator	Spud date	Total depth (ft)	Date total depth reached	Report number
Arctic Subregion:						
None						
Bering Sea Subregion:						
Norton Sound COST 1	OCS 80-7 Block 197	ARCO	06/14/80	14,583	09/16/80	OFR 83-124
Norton Sound COST 2	OCS 82-16 Block 273	ARCO	06/07/82	14,889	08/27/82	OFR 83-557
Navarin Basin COST 1	OCS 82-17 Block 801	ARCO	05/26/83	16,400	10/03/83	MMS 84-0031
St. George Basin COST 1	OCS 76-11 Block 459	ARCO	07/02/76	13,771	09/22/76	MMS 84-0016
St. George Basin COST 2	OCS 82-19 Block 390	ARCO	05/19/82	14,626	08/22/82	MMS 84-0018
N. Aleutian Basin COST 1	OCS 82-18 Block 666	ARCO	09/08/82	17,155	01/14/83	**
Gulf of Alaska Subregion:						
Cook Inlet COST 1	OCS 77-5 Block 489	ARCO	06/10/77	12,387	09/24/77	OFR 78-145
Kodiak Shelf KSST 1	OCS 76-35 Block 573	ESCI	07/13/76	4,225	08/01/76	**
Kodiak Shelf KSST 2	OCS 76-35 Block 984	ESCI	08/04/76	4,337	08/23/76	**
Kodiak Shelf KSST 4	OCS 76-35 Block 781	ESCI	08/28/76	1,391	09/19/76	**
Kodiak Shelf KSST 1	OCS 77-1 Block 999	Sun	05/25/77	8,514	07/17/77	**
Kodiak Shelf KSST 2	OCS 77-1 Block 463	Sun	07/22/77	10,452	09/08/77	**
Kodiak Shelf KSST 3	OCS 77-1 Block 14	Sun	09/13/77	9,355	10/25/77	**
Northern Gulf of Alaska - COST 1	OCS 76-60 Block 196	ARCO	07/22/75	5,100	10/09/75	OFR 76-635

*Open-file reports (OFR) are available at cost from the Books and Open-File Reports Section, U.S. Geological Survey, Federal Center-Box 25425, Denver, CO 80225, or from the National Geophysical and Solar-Terrestrial Data Center, National Oceanic and Atmospheric Administration, Code B621, 325 Broadway, Boulder, CO 80303. MMS reports are available at cost from the Alaska OCS Regional Library, Minerals Management Service, 949 E. 36th Ave., Anchorage, AK 99508-4302

**Not available at this time.

Basin and the Pribilof Basin, were formed along an axis that is parallel to the Bering Sea margin. The St. George Basin is a graben measuring 10 to 25 miles (16-40 km) wide, extending approximately 200 miles (320 km) in a northeast-southeast trend, and containing as much as 40,000 feet (12,200 m) of Tertiary and Mesozoic sediments. South and southwest of the shelf edge lies an area known as the Unimak Plateau region. This flat-top feature lies in 2,000 meters of water and is underlain by 5 to 8 miles (3-5 km) of flat-lying sediment.

Petroleum Potential.--Exploration began in the area by 1976 with the drilling of an initial COST well. A second COST well was then drilled in 1982. Ten exploratory wells, including one sidetrack well, have been drilled in the St. George Basin during 1984 and 1985.

The COST No. 1 well was drilled about 25 miles (40 km) south of the graben and encountered about 10,000 feet (3,000 m) of Tertiary sediments overlying the igneous rock basement. The COST No. 2 well was drilled along the southeastern margin of the graben and encountered over 12,000 feet (3,650 m) of Tertiary sediments overlying Mesozoic sedimentary rocks.

Potential traps in the graben include faulted anticlines, upthrown fault traps over basement horst blocks, downthrown fault traps along border faults of the graben, draping of Tertiary strata over basement fault blocks, stratigraphic onlap of Tertiary sediments onto the basement, and possible stratigraphic pinch-out of sands. Outside of the graben, potential traps include subunconformity truncation below the acoustic basement unconformity, anticlinal structures within the acoustic basement, draping of Tertiary strata over basement highs, fault-bounded traps, and stratigraphic onlap of Tertiary sediments onto basement highs. In the Pribilof Basin, potential traps include anticlines within the acoustic basement with draping in the overlying Tertiary section, upthrown fault traps over tilted basement blocks, and subunconformity truncation associated with fault-bounded anticlines.

The best potential reservoir rocks are believed to occur in the Oligocene section. At COST No. 1 well, Oligocene sands attained thicknesses greater than 150 feet (46 m). Porosities were as high as 25 percent and permeabilities were as high as 37 millidarcies. The volcanic rock fragments tend to reduce porosity and permeability because of diagenetic alteration to

zeolites and clay minerals. The Mesozoic sandstones in the COST No. 2 well were very tight.

The source rock potential as indicated by the COST wells appears to be low. The sediments were low in total organic carbon and were deposited under oxidizing conditions. Only gas-prone kerogen types were present in samples from the wells. Vitrinite reflectance data indicated the Tertiary sediments to be immature for oil generation. The "oil window" occurs at approximately the base of the Tertiary section.

The deeper portions of the St. George graben may have better source rock potential than the COST well sites because the basal graben sediments were deposited in an enclosed basin when the area south of the graben, where the COST wells were drilled, was emergent. Restricted circulation in the early stage of graben development may have been conducive to organic preservation. Thermal maturity in the graben may also be more favorable than in the COST well locations because the basal graben sediments are buried more deeply than the lowermost Tertiary sediments at the COST well sites. Therefore, the sediments may have been exposed to high enough temperatures for a sufficiently long time to generate oil. The basal Tertiary section in the Pribilof Basin may also contain favorable source rocks.

North Aleutian Basin Planning Area

Geology.--Three major structural features have been identified with the North Aleutian Basin Planning Area. Two of the features are the sediment-filled basins: the Amak and the Bristol Bay. The third feature is a basement ridge, which extends offshore from the Black Hills region of the Alaska Peninsula. The Bristol Bay Basin is a structural depression that underlies most of the planning unit. The Amak Basin is a gentle coastal sag beneath the flat southern shelf. This elongated trough has a westward-trend parallel to the Black Hills ridge. The Black Hills ridge is an offshore extension of a structural high on the Alaska Peninsula. Onshore exposures and dredge samples indicate this high is composed of arkosic to lithic sandstones of Late Jurassic age.

Petroleum Potential.--One COST well has been drilled offshore in 1983. Ten exploratory wells were drilled on the Alaska Peninsula. Although a number

of oil and gas shows were reported, none suggest a discovery of commercial size. Data from the onshore wells suggest that the most prospective area for hydrocarbons lies offshore between Port Moller and Cold Bay. Geophysical data indicate that this area contains both the thickest Tertiary section and also the most promising anticlinal structures. In addition to this area, there are less promising structures in the southwestern corner of the basin and to the north of Port Heiden. There may also be stratigraphic or fault traps along the southern flank of the offshore extension of the Black Hills uplift. A shallow, flat Tertiary section has discouraged intensive exploration north of 57° latitude.

Data from two onshore wells indicate that the middle to late Miocene sandstones of the Bear Lake Formation have the greatest reservoir potential. At a depth of 1,920 meters, these sandstones have porosities as high as 36.5 percent and permeabilities as high as 1,286 millidarcies. Below this depth the corresponding high values are 29 percent and 43 millidarcies. Shows of oil and gas have been reported from Bear Lake sandstones in both wells and may possibly occur offshore.

The best Tertiary source rocks appear to be the black marine siltstone and shale beds in the Oligocene Ste-povak Formation. Analysis of several wells onshore reveals that although thermally immature, the Paleogene strata are rich in organic matter. Off-shore, however, these rocks may be more mature due to the greater depth of burial. Other potential source rocks include the basal units of the Bear Lake and Late Jurassic and Late Cretaceous marine shales.

Shumagin Planning Area

Geology.--The Shumagin Planning Area consists mostly of the Aleutian Abyssal Plains, which were formed by Eocene-Oligocene turbidite deposits. These turbidites were deposited from many buried channels and surficial channels located in the north and northeast. Turbidite thickness ranges from 1,312 to 2,124 feet (400-800 m) in the north to about 656 feet (200 m) in the south. Faulting and flexure of the oceanic crest seaward of the Aleutian Trench have strongly affected the depositional channels.

Petroleum Potential.--Preliminary studies of offshore geophysical data indicate the presence of both structural and stratigraphic features that appear capable of entrapping hydrocarbons. However,

verification of closure, in most cases, has been tentative due to the low density of the geophysical data.

Normal and reverse faults, along with stratigraphic pinch-outs and truncations at unconformities, form potential hydrocarbon traps. To date, there have been no geologic data on the Shumagin shelf to verify the presence of either a potential source bed sequence or a porous reservoir sequence. However, geologic analysis of potential hydrocarbon sources and potential reservoirs from the adjacent Kodiak shelf suggests a low to moderate probability for the occurrence of commercial accumulations within the Shumagin Planning Area.

Gulf of Alaska Planning Area

Geology.--Interpretation from seismic data indicates that the continental margin of the Gulf of Alaska is geologically complex with different structural characteristics in southeast Alaska, Yakutat, Cape Yakataga, and the Middleton Island areas. In the southeast Alaska segment, the acoustic basement is near the surface over much of the shelf. Rocks forming the acoustic basement probably are similar to Paleozoic and Mesozoic rocks exposed in the nearby southeastern Alaska islands. The rocks that underlie the continental slope of the Yakutat segment are Late Cretaceous to Oligocene in age. The Cape Yakataga segment is characterized by numerous broad folds and associated thrust faults beneath the continental shelf and slope. Structures on the Middleton segment include tightly folded and extensively faulted anticlines and a shelf-edge structural high on which Middleton Island is located. Paleogene rocks underlie much of the area.

Petroleum Potential.--Offshore drilling commenced in the Gulf of Alaska in 1969 with the drilling of a single well in State waters. Drilling began in the Federal planning area in 1975 with the completion of a COST well. Twelve exploratory wells, including one sidetrack well, have been drilled in the planning area since 1976. The only producing field along the Gulf of Alaska, the onshore Katalla Field near Kayak Island, produced oil along a fault zone in the Katalla Formation, a local equivalent of the Poul Creek Formation. Offshore, these rocks are silty shale to shaley siltstone and serve as potential source rocks for petroleum, but are not reservoir rocks. The four offshore wells that encounter the Poul Creek Formation all have immature source rocks, and the total

organic carbon (TOC) is less than 1 percent and usually 0.5 percent. The Kulthieth Formation may be a good reservoir and possibly another source of petroleum, but this formation was encountered in only two of the offshore wells. The source rocks are mature and have over 1 percent TOC. These source rocks are more prone to have gas than oil. All of the offshore exploratory wells have been drilled into the Yakataga Formation, which is a very poor source rock and a fair reservoir rock.

Potential traps have been identified in the Yakataga and Kulthieth Formations and include large, asymmetric, elongate and doubly plunging, faulted anticlines, and traps against major faults.

Cook Inlet Planning Area

Geology.--Mesozoic and Cenozoic sedimentary rocks are a part of a belt that underlies the upper Cook Inlet, the Alaska Peninsula, and the Shelikof Strait. Marine Mesozoic rocks found locally along this belt may be more than 36,000 feet (11,000 m) thick. The continental Cenozoic rocks are as much as 25,000 feet (7,600 m) thick. Four major geologic features can be found on the flanks of Cook Inlet. They are the Alaska-Aleutian Range batholith, the Brun Bay fault, the Border Ranges fault, and the terrace of undifferentiated Mesozoic and Cenozoic rocks. The Mesozoic rocks that fill the basin beneath lower Cook Inlet and the Shelikof Strait are deformed into a broad geosyncline. Local structures superimposed on this feature include a lineation of small anticlines near the southeast flank of lower Cook Inlet, a few small anticlines beneath Shelikof Strait, and the Augustine-Seldovia Arch.

Petroleum Potential.--Generalized lithologic characteristics have been compiled from 13 exploratory wells drilled between 1978 and 1985 in lower Cook Inlet and Shelikof Strait and one COST well drilled in 1977 in lower Cook Inlet. (See chap. 3 for more detailed information on exploration of the Alaska OCS.) These lithologic characteristics were used in evaluating the four ages of rocks in the planning area for their potential as reservoir rocks and/or source rocks.

The Jurassic rocks were partially penetrated by nearly all the wells to as much as 12,000 feet (3,650 m). This section is very sandy, but it has uniformly low porosity and permeability due to cementation. These rocks have poor reservoir potential.

The Early Cretaceous rocks range up to 2,500 feet (760 m) in thickness. Although this interval has numerous sands, the sands have low porosities and permeabilities. The reservoir potential for the Early Cretaceous rocks is considered to be poor.

Rocks in the Late Cretaceous are both marine and nonmarine. The marine section has from 1,000 to 5,000 feet (300-1,520 m) of siltstone. These rocks have very few sands, and the sands have low porosity. In contrast, the nonmarine rocks are sandier and have marginal porosities, and two wells to the north encountered noncommercial quantities of oil. The marine rocks are considered to have poor reservoir potential, whereas the nonmarine rocks have good reservoir potential. The nonmarine section has only been found in the west central part of Cook Inlet.

The Tertiary rocks are Eocene to Paleocene in age. These rocks are from 500 to 65,000 feet (150-1,520 m) thick, and their lithology ranges from tuffaceous siltstone to massive conglomerate. This section has low porosity and has very poor reservoir potential.

RESOURCE ESTIMATES FOR THE ALASKA OCS REGION

Table 1-2 on the next page presents the current undiscovered economically recoverable oil and gas resource estimates for the Alaska OCS planning areas.

Table 1-2. Estimates of undiscovered economically recoverable oil and gas resources in the Alaska OCS Region as of January 1987

[Oil and BOE in billion barrels; gas in trillion cubic feet]

[illegible]

Table 1-2. Estimates of undiscovered economically recoverable oil and gas resources in the Alaska OCS Region as of January --continued

[Oil and BOE in billion barrels; gas in trillion cubic feet]

Planning area	Conditional oil			Conditional gas			MP _{HC} ¹	Risky mean oil	Risky mean gas
	95% case	Mean case	5% case	95% case	Mean case	5% case			
Gulf of Alaska Subregion:									
Shumagin									
Leased and unleased	0.12	0.28	0.57	0.00	0.00	0.00	0.01	*	0.00
Unleased	0.12	0.28	0.57	0.00	0.00	0.00	0.01	*	0.00
Leased	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kodiak									
Leased and unleased	0.11	0.43	0.95	0.00	0.00	0.00	0.03	0.01	0.00
Unleased	0.11	0.43	0.95	0.00	0.00	0.00	0.03	0.01	0.00
Leased	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gulf of Alaska									
Leased and unleased	0.18	0.98	2.32	0.00	0.00	0.00	0.04	0.04	0.00
Unleased	0.18	0.98	2.32	0.00	0.00	0.00	0.04	0.04	0.00
Leased	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cook Inlet									
Leased and unleased	0.14	0.17	0.26	0.00	0.00	0.00	0.01	*	0.00
Unleased	0.14	0.17	0.26	0.00	0.00	0.00	0.01	*	0.00
Leased	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Alaska Region:									
Leased and Unleased	1.10	3.32	7.24	0.00	0.00	0.00	0.28	0.92	0.00

* Negligible.

¹The marginal probability of hydrocarbons. The probability that economically recoverable hydrocarbons exist in the area under study.

N/A = Not Available due to insufficient number of data points.

NOTE: Three categories of resources (unleased, leased, and total) required three separate PRESTO computer runs for each planning area (see Cooke, 1985 "Estimates of Undiscovered, Economically Recoverable Oil and Gas Resources for the Outer Continental Shelf as of July 1984," OCS Report MMS 85-0012.) In some cases splitting of prospects into leased and unleased caused portions of the prospects to be subeconomic. Therefore, adding the risky mean quantities for the unleased acreage to risky mean quantities for the leased acreage may not result in the risky mean quantities for the total acreage. However, the total estimate was properly derived by running the PRESTO program for all prospects.

Atlantic OCS Region

The Atlantic OCS Region is divided into four planning areas for the purpose of OCS oil and gas leasing. The region extends from offshore Maine to the Florida Keys. Figure 1-4 on the next page depicts the location of the Atlantic OCS planning areas and their basins and depocenters. Please refer to this figure as you read through this section.

GEOLOGY AND PETROLEUM POTENTIAL OF THE ATLANTIC OCS REGION

North Atlantic Planning Area

Geology.--The North Atlantic continental shelf, slope, and rise are dominated by the Georges Bank Basin, a structural depression in the crystalline basement rock. It is approximately 350 miles (560 km) long and 120 miles (190 km) wide. Geologists believe that during the initial opening of the Atlantic Ocean, either during the Permian or Triassic, opposing rotations of the American and African plates created tensional forces, resulting in the formation of large fault blocks in what is now considered basement rock of the Georges Bank Basin. As a result of extensive erosion and transport of onshore components, the basin was filled with large amounts of sand, gravel, and clay, resulting in further subsidence.

The North Atlantic Planning Area can be divided into three areas of hydrocarbon potential. These areas are (1) the Gulf of Maine, (2) the Georges Bank Basin (a zone of thick sediments centered on, and approximately parallel to, the modern shelf break), and (3) the deep-water area seaward of the continental slope. Because of limited geological and geophysical data, the petroleum potential of the Gulf of Maine and deep-water areas is not well known. The most prospective part of the planning area is the zone of thick sediments centered below the present shelf edge. This area includes the Jurassic paleoshelf-edge carbonate buildup. The buildup in the Georges Bank area has not yet been drilled. Samples from the equivalent strata to the northeast (Scotian Shelf) have reasonably good porosity and permeability and show evidence of hydrocarbons. Traps associated with the buildup include anticlines shoreward of the buildup, stratigraphic traps, and fault closure.

Petroleum Potential.--Exploration for petroleum in the Georges Bank Basin began in April 1976 when

the first of two COST wells was spudded. See table 1-3 (p. 20) for a detailed listing of COST wells drilled on the Atlantic OCS. Eight additional wells were drilled by industry in 1981-82, all of which were dry. (See chap. 3 for more detailed information on exploration of the Atlantic OCS).

Potential source and reservoir rocks in a number of the wells drilled on the shelf have been analyzed. Source-rock quality is in the poor to fair range. Most of the kerogen is of terrestrial origin and, thus, is considered gas prone.

Reservoir rocks in the thermally mature interval of the section tend to be tight with porosity ordinarily less than 5 percent. Sandstone as a distinct lithology is largely absent in the thermally mature interval throughout most of the zone of thick sediments. Potential reservoir lithologies thus appear to be limited to limestones with secondary porosity development.

Mid-Atlantic Planning Area

Geology.--The Mid-Atlantic OCS Planning Area is dominated structurally by the Baltimore Canyon Trough, an elongated depression in the crystalline basement rock. The trough extends from the vicinity of Cape Hatteras northeastward approximately 400 miles (640 km) to terminate against the Long Island Platform. Geologists believe the trough formed in the Late Triassic when an ancient supercontinent separated along a rift zone to create the early Atlantic Ocean. The edge of the rift zone subsided along faults, and sediments that had eroded from the continent to the west were deposited in the area that has become the continental margin. Deposition and subsidence continued, resulting in an accumulation of sediments greater than 50,000 feet (15,200 m) thick in places, which were deposited under marine and non-marine conditions.

Petroleum Potential.--The first deep stratigraphic test well (COST B-2) in the Mid-Atlantic Planning Area was drilled in 1975. The COST B-3 was completed in 1979 and was followed by 32 industry exploratory wells. Only five of the wells drilled had significant hydrocarbon discoveries. These were drilled on the Texaco-Tenneco Block 598-642 Unit. The COST B-3 well, located about 30 miles southwest of the Texaco-Tenneco Block 598-642 Unit, encountered a show of gas from a 6-foot zone below 15,000 feet (4,500 m).

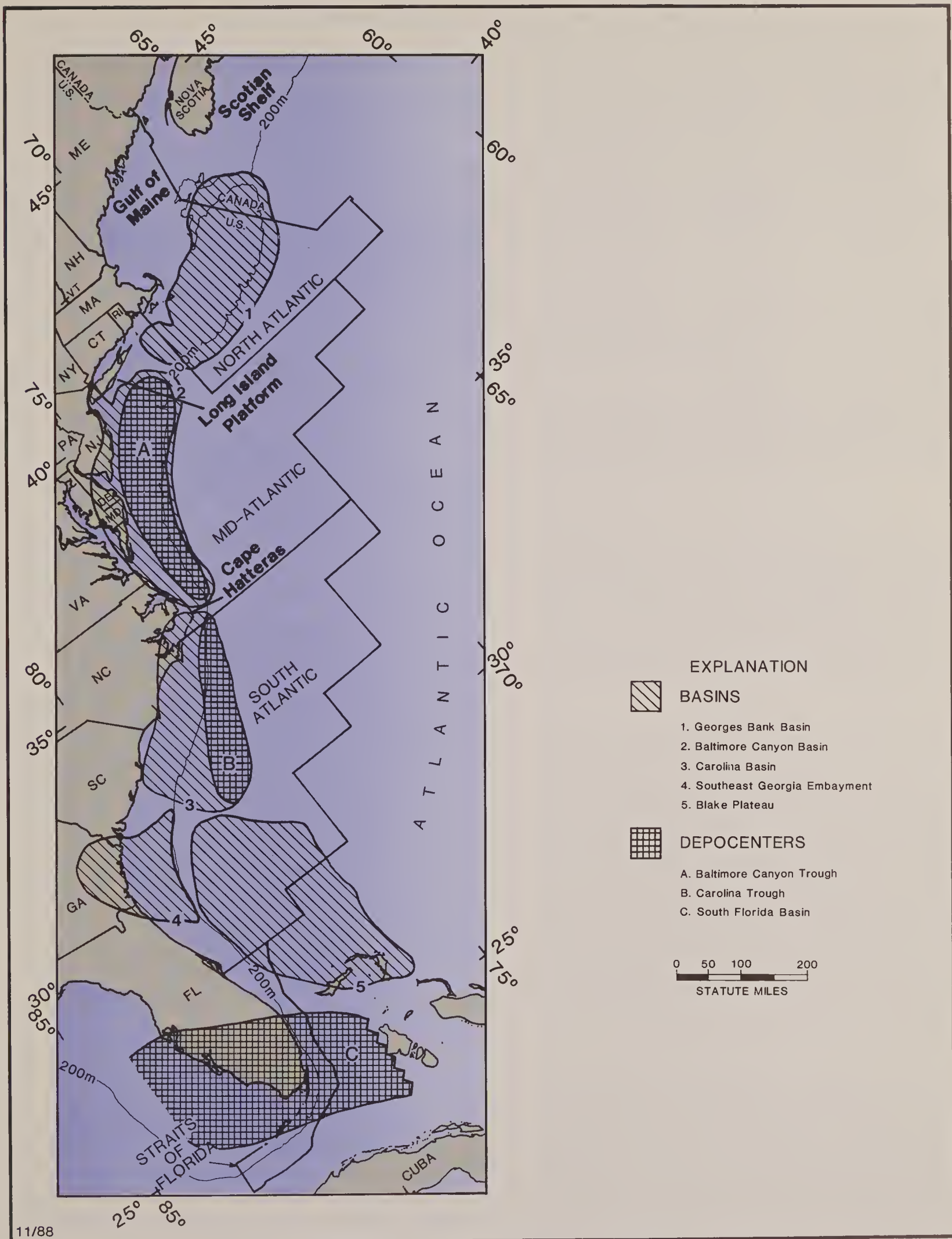


Figure 1-4. Atlantic OCS Region planning areas, basins, and depocenters.

Table 1-3. COST wells drilled on the Atlantic OCS

Planning area/ well number	Lease/block number	Operator	Spud date	Total depth (ft)	Date total depth reached	Report number
North Atlantic G-1	NK 19-11 Block 79	Ocean Production	04/06/76	16,071	07/27/76	OCS-0003 OCS-0059
North Atlantic G-2	NK 19-12 Block 141	Ocean Production	01/06/77	21,872	08/30/77	OCS-0004 OCS-0059
Mid-Atlantic B-2	NJ 18-3 Block 594	Ocean Production	12/14/75	16,043	03/28/76	OCS-0001 OCS-0053
Mid-Atlantic B-3	NJ 18-6 Block 66	Chevron	10/09/78	15,820	01/24/79	OCS-0002 OCS-0058
South Atlantic GE-1	NH 17-5 Block 387	Ocean Production	02/24/77	13,254	06/15/77	OCS-0005 OCS-0006

Among the most prospective parts of the Mid-Atlantic Planning Area is the zone of thick sediments beneath the modern continental shelf area. The carbonate buildup and associated fore- and back-buildup traps are considered part of this zone. Several wells drilled in this trend were plugged and abandoned.

Potential source and reservoir rocks in a number of wells have been analyzed. Source-rock quality is generally in the poor to good range. Much of the kerogen is terrestrial in origin, indicating most of the generated hydrocarbons would be gas rather than oil. Presumably, the potential for oil would increase seaward where the proportion of algal, oil-prone kerogen would be expected to increase. However, in the sedimentary section in the Baltimore Canyon Trough that is considered thermally mature for hydrocarbon generation, the source-rock shales tend to be lean in organic matter (usually less than 1 percent).

Reservoir rocks below 10,000 feet (3,000 m) are limited to sandstones with relatively low porosity and permeability. Some development of secondary porosity by dolomitization of limestones has been observed, but is considered only of local significance. Well-log interpretations show that only a small fraction of the total sand thickness below 10,000 feet (3,000 m) has porosities greater than 5 percent. Permeability is low because of infilling of intergranular voids by calcite cement and by clay- to silt-sized sediment.

South Atlantic Planning Area

Geology.--The South Atlantic Planning Area contains three major sedimentary basins: the Carolina Trough, the Southeast Georgia Embayment, and the Blake Plateau Basin. The Carolina Trough is a narrow, linear basin. It is about 280 miles (450 km) long, 25 miles (40 km) wide, and contains over 30,000 feet (9,000 m) of sedimentary fill. The rocks range in age from Triassic, through Recent, with most of the section being of Jurassic age. The Southeast Georgia Embayment is the smallest and least geologically attractive sedimentary basin with only 15,000 feet (4,550 m) of sediments. The Blake Plateau Basin by contrast is the largest sedimentary basin off the U.S. east coast and contains over 30,000 feet of sedimentary section. Most of the basin is thought to be floored by transitional basement generated during the rifting process. Sediments above basement are mostly limestones and dolomites. Well over half of the total thickness is Jurassic in age with most of the remainder being Cretaceous.

Petroleum Potential.--The petroleum potential of the South Atlantic Planning Area is difficult to assess, largely because of the lack of exploratory well data. The first deep well in the planning area was the COST GE-1 well completed in 1977 in the Southeast Georgia Embayment. This well was followed by six unsuccessful exploratory wells, also drilled in the Southeast Georgia Embayment in 1979.

The Carolina Trough appears to have good potential for hydrocarbon generation and entrapment. It has sufficient sediment thickness to ensure an interval of thermal maturity and has large numbers of attractive traps. Source rocks in the basin are most likely to yield gas rather than oil. A thick regional salt bed, deposited immediately after rifting ceased, has been deformed by sediment loading and has produced a number of diapirs on the seaward edge of the basin. A growth fault on the continental slope associated with salt flow may have produced other traps. Other faults are common within and on the margins of the basin.

The Blake Plateau Basin may have attractive possibilities for commercial accumulations of hydrocarbons. The basin is large in area, probably contains thermally mature sediments, and may have more oil-prone source rocks than the basins to the north. The sediments appear unaffected by faulting or deformation, suggesting that the basin has been tectonically stable since Lower Jurassic time. The few structures that exist are really large, but of very low relief. There is also evidence of a carbonate buildup trend.

Straits of Florida Planning Area

Geology.--The continental shelf and slope are a continuation of the Florida Platform, which is composed of Mesozoic-Cenozoic carbonates. The Straits of Florida Planning Area shelf has been removed from the major focus of rapid sedimentation since Mesozoic times. In particular, Pleistocene sediments, which attain great thickness over the continental shelf of the rest of the northern Gulf of Mexico, are virtually nonexistent in the Florida Straits shelf. The fine-grained sediments that manage to filter through the South Florida Keys are flushed out of the Straits of Florida Planning Area by the Gulf Stream. The topographically prominent features of the shelf are Pleistocene coral and oolite reefs. The high points of these reefs form the Florida Keys, which extend from the Marquesas to Key Biscayne.

Petroleum Potential.--Commercial hydrocarbon accumulations have not been discovered in the Florida Straits region, but minor production occurs in areas peripheral to the region (northwest coast of Cuba and Sunniland trend in Florida). These small fields produce from carbonate reservoirs, and the oil and gas may have originated from carbonate source rocks. Wells drilled in Bahamian waters indicate that much of the section has been flushed by circulating

water, resulting in locally excellent porosity (occasionally cavernous). This flushing also appears to have driven out any in-situ hydrocarbons. Petroleum potential may exist in the deeper parts of the section where limestone has been altered to dolomite, resulting in significant secondary porosity development. Deposition of evaporites in the Jurassic does not appear to have resulted in large numbers of diapiric structures with which hydrocarbon accumulations could be associated.

RESOURCE ESTIMATES FOR THE ATLANTIC OCS REGION

Table 1-4 on the next page presents the current undiscovered economically recoverable oil and gas resource estimates for Atlantic OCS Planning Areas.

Table 1-4. Estimates of undiscovered economically recoverable oil and gas resources in the Atlantic OCS Region as of January 1987

[Oil and BOE in billion barrels; gas in trillion cubic feet]

Planning area	Conditional oil ¹			Conditional gas			MP _{HC} ²	Risky mean	Risky mean oil ³	Risky BOE ⁴ gas
	95% case	Mean case	5% case	95% case	Mean case	5% case				
North Atlantic										
Leased and unleased	0.05	0.11	0.27	1.12	2.54	6.06	0.39	0.04	1.00	0.22
Unleased	0.05	0.11	0.27	1.12	2.54	6.06	0.39	0.04	1.00	0.22
Leased	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mid-Atlantic										
Leased and unleased	0.08	0.22	0.47	2.36	5.35	11.46	0.44	0.10	2.36	0.52
Unleased	0.04	0.17	0.38	2.08	4.40	9.05	0.44	0.08	1.95	0.43
Leased	0.02	0.08	0.22	0.29	1.61	4.16	0.32	0.03	0.51	0.12
South Atlantic										
Leased and unleased	0.07	0.21	0.52	1.69	4.60	10.38	0.23	0.05	1.06	0.24
Unleased	0.07	0.20	0.49	1.69	4.39	9.68	0.23	0.05	1.01	0.23
Leased	*	0.01	0.02	0.15	0.26	0.52	0.09	*	0.02	*
Straits of Florida										
Leased and unleased	0.18	0.34	0.63	0.24	0.57	1.47	0.19	0.06	0.11	0.08
Unleased	0.18	0.34	0.63	0.24	0.57	1.47	0.19	0.06	0.11	0.08
Leased	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Atlantic Region										
Leased and unleased	0.02	0.32	1.17	2.63	3.65	10.22	0.80	0.25	4.51	1.05

* Negligible

¹Conditional resource estimates are predicated upon the assumption that economically recoverable quantities of hydrocarbons actually exist in the area under consideration.

²The marginal probability of hydrocarbons. The probability that economically recoverable hydrocarbons exist in the area under study.

³Risky (unconditional) resource estimates reflect the probability that commercial accumulations of hydrocarbons may not exist in the area under consideration.

⁴Barrel of oil equivalent (energy basis): the sum of the risky mean gas divided by 5.62 Mcf/bbl and the oil volume. A barrel of oil has an average btu content equivalent to 5.62 Mcf of gas.

Note: Three categories of resources (unleased, leased, and total) required three separate PRESTO computer runs for each planning area. In some cases, splitting of prospects into leased and unleased caused portions of the prospects to be subeconomic. Therefore, adding the risky mean quantities for the unleased acreage to risky mean quantities for the leased acreage may not result in the risky mean quantities for the total acreage. However, the total estimate was properly derived by running the PRESTO program for all prospects.

Gulf of Mexico OCS Region

The Gulf of Mexico OCS Region is divided into three planning areas for the purpose of OCS oil and gas leasing. The region lies offshore the States of Texas, Louisiana, Mississippi, Alabama, and Florida. Figures 1-5 and 1-6 (p. 24 and p. 25) displays the Gulf of Mexico OCS planning areas, basins, depocenters, and structural features. Table 1-5 (p. 26) provides a list of the COST wells drilled on the Gulf of Mexico OCS.

GEOLOGY AND PETROLEUM POTENTIAL OF THE GULF OF MEXICO REGION

Eastern Gulf of Mexico Planning Area

Geology.--The continental margin of the eastern Gulf of Mexico is dominated by the Florida Platform, which is composed of a thick accumulation of bathyal to neritic carbonate rocks and evaporite deposits of Mesozoic and Cenozoic age. The platform is fronted by a prominent escarpment built by shelf-edge reef complexes during the Early Cretaceous. The northern half of the platform was built on a continental foundation composed of upper Precambrian and lower Paleozoic igneous and metamorphic rocks and capped by undeformed clastic sediments of Ordovician, Silurian, and Devonian ages. Triassic red beds and associated diabases are common in the extensive graben systems that underlie northwestern Florida. The southern peninsula of Florida is underlain by basement composed of volcanic and hypabyssal rocks of Triassic and Early Jurassic age.

Petroleum Potential.--The eastern Gulf of Mexico is primarily a carbonate province. Exploratory drilling began in 1974, and two discoveries have received determinations of producibility by MMS under 30 CFR 250.11, to date. Production occurs onshore in the South Florida Basin from the Lower Cretaceous Sunniland Formation. Eleven oil fields have been discovered in this basin on the Florida mainland. The fields are associated with magnetic highs and noses on the northeastern rim of the basin. Production occurs between 11,320 and 11,890 feet (3,450 and 3,620 m). The offshore part of the basin has not been fully tested, but may be prospective. Production also occurs in the Florida Panhandle from Jurassic sediments.

Source rocks in the eastern Gulf of Mexico are predominantly marine shales and organic-rich carbonates ranging in age from Jurassic to Cretaceous. Cenozoic rocks may be important sources in deep water. Tertiary sediments do not appear to have a promising suite of source rocks. Reservoir rocks range in age from Jurassic to Cretaceous. Jurassic reservoir rocks are primarily grain-supported wackestones, packstones and grainstones, and dolomites. Prospective Cretaceous reservoir rocks are deltaic and turbidite sandstones, carbonate reefs developed on the landward side of uplifted blocks, and shell zones. Many potential traps exist in the eastern Gulf of Mexico, including anticlines and faulted anticlines, structural closure against normal and growth faults, and a variety of stratigraphic and reef traps.

Specifically, in the area of the Destin anticline on the northwest Florida shelf, several dry holes have been drilled. However, excellent reservoir rocks are found in the Norphlet Formation (Lower Jurassic), and the structure still has potential. This potential can be seen by numerous discoveries in the Norphlet trend within Mobile Bay. A field of salt diapirs (DeSoto diapir field), located southwest of Destin, has not been tested and may have hydrocarbon potential.

Regional growth faults parallel the shelf edge in the DeSoto Canyon area and may contain traps on the downthrown side. Peripheral and radial faulting associated with salt structures may contain potential traps. Structural and stratigraphic traps in Jurassic strata, which onlap Paleozoic metamorphic rocks around the edge of the Middle Ground Arch, are possible exploration targets. Potential targets in the Central Florida Trough are structural and stratigraphic traps in Jurassic and Lower Cretaceous strata, which onlap Paleozoic igneous and metamorphic rocks. Recent discoveries along the flexure trend within the Mississippi Canyon and Viosca Knoll areas adjacent to the Eastern Gulf of Mexico Planning Area seem to indicate that the flexure trend may extend into the planning area. Further development of these discoveries will help to determine the petroleum potential of the flexure trend within the Eastern Gulf of Mexico Planning Area.

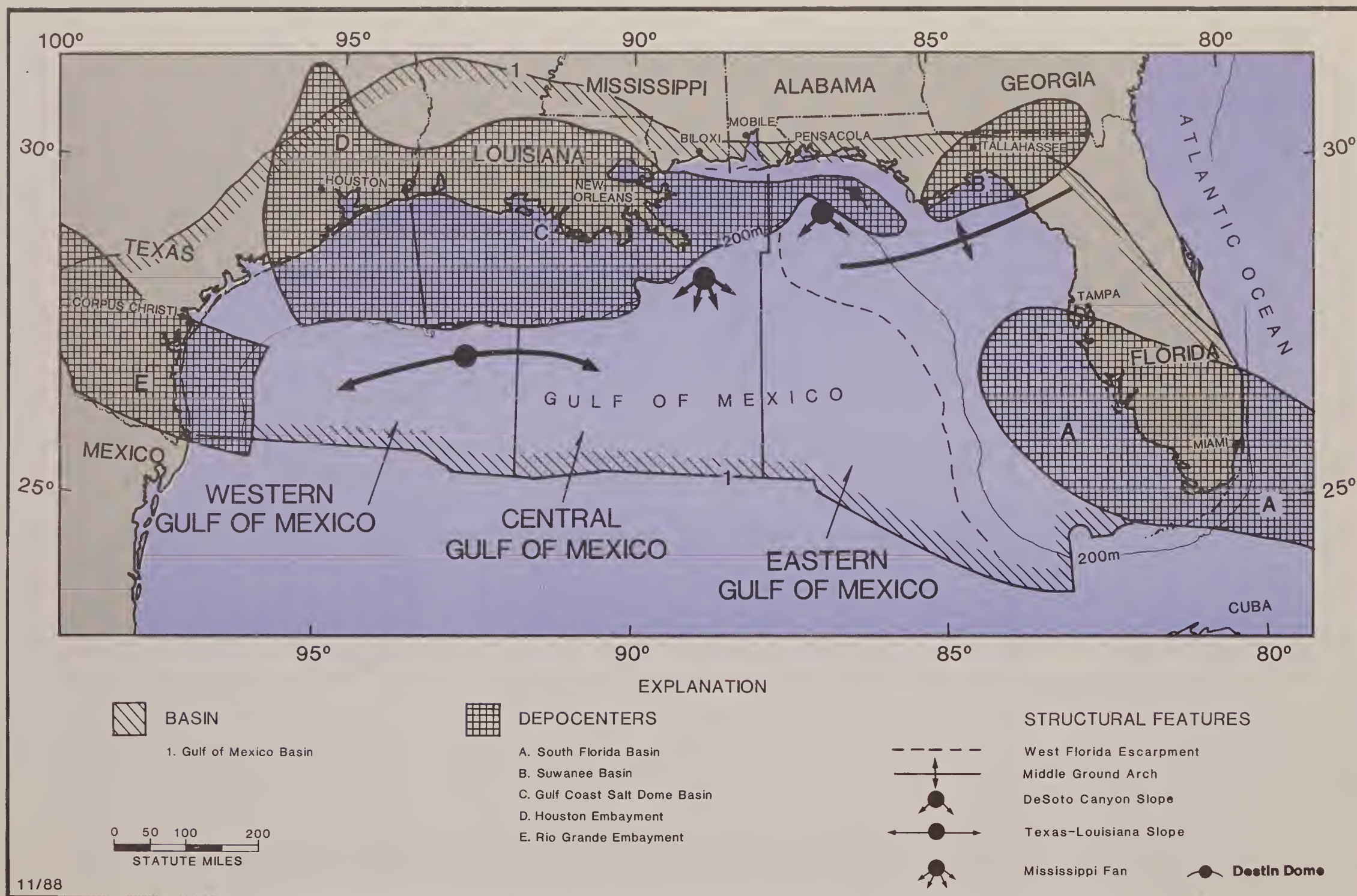


Figure 1-5. Gulf of Mexico OCS Region planning areas, basins, and depocenters.

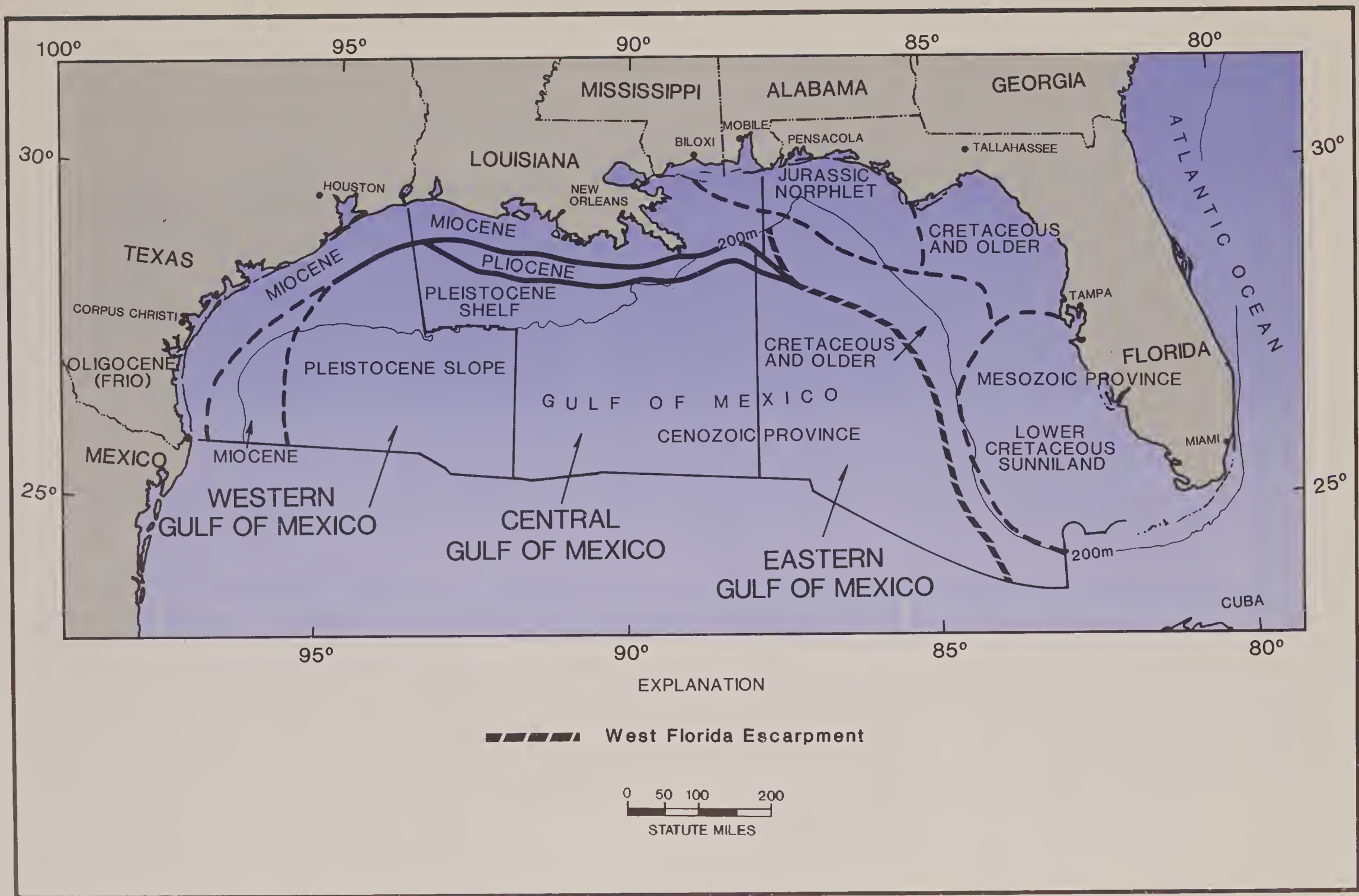


Figure 1-6. Gulf of Mexico OCS Region planning areas and structural features.

Table 1-5. COST wells drilled on the Gulf of Mexico OCS

Planning area/ well number	Lease/block number	Operator	Spud date	Total depth (ft)	Date total depth reached	USGS open-file report number
Western Gulf of Mexico						
South Padre Island Cost 1	1076-L	Phillips	08/25/74	15,763	11/13/74	75-174
Mustang Island Cost 2	A-29	Superior	12/06/74	13,000	02/19/75	75-259

Central Gulf of Mexico Planning Area

Geology.--The geologic history of the Central Gulf of Mexico Planning Area is generally the same as for the Western Gulf of Mexico Planning Area; therefore, both discussions were combined in this section. The continental margin of the northern Gulf of Mexico extends from DeSoto Canyon to northern Mexico and from more than 187 miles (300 km) inland of the central gulf coast to the deep gulf floor. It is composed of a broad wedge of Mesozoic and Cenozoic strata that accumulated almost continuously from Jurassic time to present. Mesozoic and Cenozoic deposits are more than 248 miles thick beneath the lower coastal plain and adjacent continental shelf. For the most part, the margin is a Cenozoic clastic platform built by the deposition of sediments from the continental interior after the Late Cretaceous-Paleocene Laramide orogeny. Sediment supplies generally exceeded the subsidence rate, prograding the seaward face of the margin more than 248 miles (400 km) from the edge of Cretaceous carbonate platform deposits under the coastal plain to the present position of the continental slope. Along the inner regions of the coastal plain from Alabama to southwestern Texas, updip members of Mesozoic and Cenozoic units rest unconformably on complexly folded and faulted Paleozoic rocks of the Ouachita and Appalachian tectonic belts.

Petroleum Potential.--As of December 31, 1987, the Central Gulf of Mexico Planning Area has 549 oil and gas fields, which range in age from Miocene to Pleistocene. An additional nine fields are classified as older than Miocene. Source rocks for the central Gulf of Mexico consist primarily of organic-rich shales that range in age from lower Cenozoic through Pleistocene. However, potential Mesozoic source

rocks occur in the central Gulf of Mexico east of the Mississippi Delta. East of the delta, reservoir rocks in the central Gulf of Mexico range in age from Jurassic through Miocene, whereas reservoir rocks in the central Gulf of Mexico, south of Louisiana, consist primarily of sands ranging in age from Miocene to Pleistocene. The producing horizons become progressively younger in age in a seaward direction. Types of traps include anticlines and faulted anticlines formed by deep-seated salt and shale ridges, salt and shale domes, salt massifs, and structural closure against normal and growth faults. Stratigraphic traps include (1) sands onlapping salt and shale domes and anticlines and (2) facies changes from sands to impermeable shale in updip directions and at angular unconformities.

In the portion of the central Gulf of Mexico east of the Mississippi Delta, prospective traps occurring in the Jurassic and Cretaceous include (1) updip sections where sands or porous carbonates pinch out or truncate updip, (2) anticlinal structures developed on the downthrown sides of growth faults over deep-seated salt domes and pillows, and (3) very subtle fault closures.

The oldest producing Cenozoic horizon in the central Gulf of Mexico is lower Miocene. Miocene production extends from east of the Mississippi Delta into the Western Gulf of Mexico Planning Area. Production is primarily from delta sands.

Pliocene production extends from east of the Mississippi Delta into the High Island area in the Western Gulf of Mexico Planning Area. Pliocene production also continues beneath the Pleistocene in a Pliocene-Pleistocene producing trend.

Pleistocene production extends from the shelf edge south of Louisiana into the Western Gulf of Mexico Planning Area on the continental slope. Pliocene and Pleistocene production has already been established at several locations in water depths approaching 3,280 feet (1,000 m) and will probably exceed all other producing horizons.

Two major exploration trends include the Jurassic Norphlet play and the Pliocene-Pleistocene deep-water flexure trend. The Norphlet is a gas play of eolian sands 20,000 feet (6,100 m) deep in the Mobile Bay area. The flexure trend extends along the Louisiana-Texas continental slope where deep-water salt acts as a dike against Pliocene-Pleistocene sands. Reservoirs occur below 9,000 feet (2,700 m) in depth.

Western Gulf of Mexico Planning Area

Geology.--Because the Central and Western Gulf of Mexico Planning Areas are generally the same, please refer to the geology discussion provided for the Central Gulf of Mexico Planning Area above.

Petroleum Potential.--As of December 31, 1987, there were 129 producing fields in the western Gulf of Mexico, and 88 of them were in the Galveston and High Island areas at the northern end of the Western Gulf of Mexico Planning Area. Production extends as far south as North Padre Island, where there are three fields. Exploration and discovery have, in general, progressed from north to south and eastward into deeper water.

Source rock consists chiefly of organic-rich Cenozoic shales. Studies indicate the possibility of Oligocene reservoir rocks in deeper waters. Miocene reservoirs extend the length of the Western Gulf of Mexico Planning Area in a narrow inshore band that widens to the northeast. In the northern part of the Western Gulf of Mexico Planning Area, Pleistocene reservoirs extend to the southern part of the Galveston area and contain accumulations of gas and condensate in the High Island area. Trapping mechanisms are the same as those in the central Gulf of Mexico, except that traps associated with rollover into growth faults are more prevalent, and there is less salt diapirism. Numerous anticlinal shale ridges also provide structures for traps.

Eocene production is onshore, mainly from lower axial portions of the embayments on the Texas coastal plain. There is no apparent Oligocene production in Federal waters; however, Oligocene turbidites may be potentially productive as is true in State waters.

Exploration trends include the westward extension of the flexure trend into the East Breaks deep-water area and the Corsair trend. This play involves a 100-mile listric growth fault with an anticlinal rollover feature trending northwest-southwest through the Brazos, Matagorda Island, and Mustang Island areas. The productive sands are middle Miocene in age deposited in a deltaic environment. Prospective objectives are as deep as 16,000-18,000 feet (4,900 to 5,500 m).

RESOURCE ESTIMATES FOR THE GULF OF MEXICO OCS REGION

Table 1-6 on the next page presents the current undiscovered economically recoverable oil and gas resource estimates for Gulf of Mexico OCS planning areas.

Table 1-6. Estimates of undiscovered economically recoverable oil and gas resources in the Gulf of Mexico OCS Region as of January 1987

[Oil and BOE in billion barrels; gas in trillion cubic feet]

Planning area	Conditional oil ¹			Conditional gas			MP _{HC} ²	Risky mean oil ³	Risky mean gas	Risky mean BOE ⁴
	95% case	Mean case	5% case	95% case	Mean case	5% case				
Eastern Gulf of Mexico										
Leased and unleased	0.07	0.24	0.51	0.01	1.21	3.41	0.90	0.22	1.09	0.41
Unleased	0.06	0.19	0.38	0.01	0.80	2.72	0.89	0.17	0.71	0.30
Leased	0.01	0.09	0.28	*	0.69	1.69	0.59	0.05	0.41	0.12
Central Gulf of Mexico										
Leased and unleased	1.63	3.82	6.70	17.61	37.66	63.40	1.00	3.82	37.66	10.52
Unleased	0.69	2.76	5.51	7.24	25.95	50.86	1.00	2.76	25.95	7.38
Leased	0.46	1.04	1.82	4.88	11.76	20.03	1.00	1.04	11.76	3.13
Western Gulf of Mexico										
Leased and unleased	0.33	1.58	3.41	7.26	25.40	51.31	1.00	1.58	25.40	6.10
Unleased	0.18	1.42	3.24	3.58	21.22	46.73	1.00	1.42	21.22	5.20
Leased	0.03	0.15	0.34	0.81	4.22	8.98	0.99	0.15	4.20	0.90
Total Gulf of Mexico Region										
Leased and unleased	2.77	5.64	9.88	36.01	64.33	103.65	1.00	5.64	64.33	17.0

* Negligible.

¹Conditional resource estimates are predicated upon the assumption that economically recoverable quantities of hydrocarbons actually exist in the area under consideration.²The marginal probability of hydrocarbons. The probability that economically recoverable hydrocarbons exist in the area under study.³Risky (unconditional) resource estimates reflect the probability that commercial accumulations of hydrocarbons may not exist in the area under consideration.⁴Barrel of oil equivalent (energy basis): the sum of the risky mean gas divided by 5.62 Mcf/bbl and the oil volume. A barrel of oil has an average btu content equivalent to 5.62 Mcf of gas.

Note: Three categories of resources (unleased, leased, and total) required three separate PRESTO computer runs for each planning area. In some cases, splitting of prospects into leased and unleased caused portions of the prospects to be subeconomic. Therefore, adding the risky mean quantities for the unleased acreage to risky mean quantities for the leased acreage may not result in the risky mean quantities for the total acreage. However, the total estimate was properly derived by running the PRESTO program for all prospects.

Pacific OCS Region

The Pacific OCS Region is divided into four planning areas for the purpose of OCS oil and gas leasing. These areas, as well as basins and depocenters, are depicted in figure 1-7 on the next page. Please refer to this figure as you read through this section. The region lies offshore Washington, Oregon, and California.

GEOLOGY AND PETROLEUM POTENTIAL OF THE PACIFIC OCS REGION

Washington-Oregon Planning Area

Geology.--The Washington-Oregon Planning Area includes the region between the offshore extension of the California-Oregon border and the offshore extension of the U.S.-Canadian border. Within this area, in addition to the northernmost extension of the Eel River Basin, five basins in the Coos Bay, Newport, and Astoria areas of offshore Washington compose an elongate trough in which as much as 25,000 feet (7,600 m) of Tertiary sedimentary and volcanic rocks have accumulated. The western boundary of this trough lies near the base of the continental slope. The eastern margin is covered by upper Cenozoic lava flows from the Cascade Range. The geologic history of this trough is complicated by the deposition of thousands of feet of marine sediments, by submarine and subaerial volcanic eruptions, by extensive sheets of basaltic rock, and by several periods of tectonic uplift and erosion.

Petroleum Potential.--A total of 12 wells were drilled in the planning area between 1965 and 1967 following the only OCS oil and gas lease sale in the area held in 1964. Eight wells were drilled off Oregon and four off Washington. Of the eight Oregon wells, one tested two gas zones at 50 thousand cubic feet per day (Mcf) and 70 Mcf; another encountered shows of oil and gas; and a third recovered samples indicating high gravity crude oil in late Neogene sediments. Two of the four wells off Washington encountered hydrocarbons. One well tested 10 to 20 Mcf, with shows of oil and gas; and the second well recovered samples indicating medium-to-high gravity crude oil.

The Mist gas field was discovered onshore in 1979 in the northwestern corner of Oregon. Reservoirs in the field are sandstones of Eocene age. In southwestern Washington, minor amounts of oil have been

produced from "Hoh Rocks" of Miocene, Oligocene, and Eocene age in the Ocean City oil field.

Although Monterey-type fracture reservoir rocks are absent in the Washington-Oregon Planning Area, other potential Neogene and late Paleogene sandstone reservoir rocks are present. Source rocks of adequate richness are also present in the Neogene and late Paleogene shales.

Volcanic activity, prevalent during much of Tertiary time in the area, has caused many of the sediments to be tuffaceous, which results in poor reservoirs.

Shale "pillows" were noted on seismic profiles in the Coos Bay, Newport, and Astoria areas of Oregon, and elongate shale diapirs penetrating upward to the seafloor were identified on seismic profiles in the Willapa area.

Northern California Planning Area

Geology.--The Northern California Planning Area is within the offshore portion of the Coast Ranges geomorphic province, and structural folds and faults tend to trend northeast-southeast to north-south. The Eel River Basin and the Point Arena Basin are located within this planning area. The Eel River Basin offshore extends northward from the Mendocino fracture zone to Cape Blanco in southern Oregon. Sediments in the basin overlaying metamorphic Franciscan basement rock include rocks of Cretaceous and early Paleogene age, which are separated from late Neogene age rocks of the "Wildcat Group" by a major unconformity. The Point Arena Basin is bounded on the east by the San Andreas fault, on the west by the Oconostota uplift (Curry, 1966; Silver, 1971), on the south by the Gualala uplift, and on the north by the Mendocino fracture zone. Although rocks of Paleogene age are present in the basin, the younger portion has been removed by erosion during uplift in late Paleogene time. These older rocks are overlain by a thick section of Neogene rocks, which range from earliest Miocene through Quaternary in age.

Petroleum Potential.--Three wells were drilled by Shell in 1965-66 in the Point Arena Basin following the 1963 OCS lease sale. One well, drilled on a tightly folded structure, recovered drilled cuttings coated with free tar oil. In the other two wells, weak oil shows were noted.

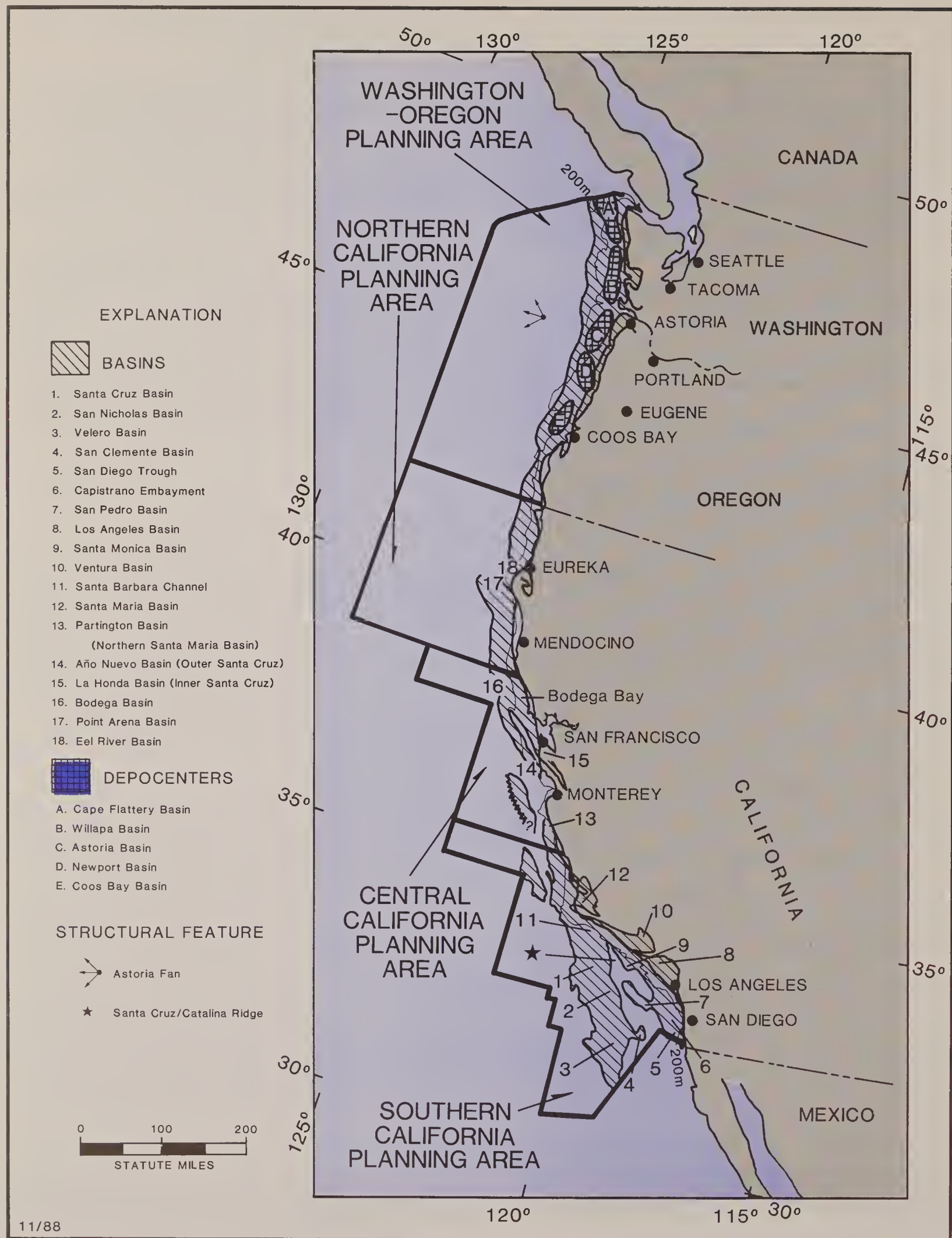


Figure 1-7. Pacific OCS Region planning areas, basins, and depocenters.

The primary source and reservoir rocks in the Point Arena Basin are in the Monterey formation of middle and late Miocene age. Additional hydrocarbon source rocks and potential reservoir rocks exist in the shales and sandstones above and below the Monterey formation. Oil has been found onshore in Monterey Formation outcrops.

In the offshore Eel River Basin, four exploratory wells were drilled between 1964 and 1965. There were no hydrocarbon shows in any of the wells. Two of the wells encountered "Wildcat Group" sediments from which gas is produced onshore.

Commercial gas has been produced from thin Pliocene turbidite sandstone reservoirs in one field in the onshore Eel River Basin, and minor amounts of high gravity oil have been produced from thin sandstones in Upper Cretaceous rocks near Petrolia, 10 miles (16 km) south of the Eel River Basin. The Cretaceous rocks plus lower Paleogene rocks may have contributed gas to the Pliocene and potential Miocene reservoir rocks. Shales of Pliocene and Miocene age may also be source rocks offshore.

Central California Planning Area

Geology.--The northern portion of the Santa Maria offshore basin (sometimes referred to as the "Partington Basin"), the Ano Nuevo (Outer Santa Cruz) Basin, the La Honda (Inner Santa Cruz) Basin, and the Bodega Basin are located within the planning area. The Ano Nuevo Basin is a small Neogene basin extending northwest from Monterey Bay to the base of the continental slope west of the Farallon High. The onshore La Honda Basin extends northwest from east of Monterey Bay to the coast at Half Moon Bay, south of San Francisco. The basin possibly extends offshore to the northwest across the Seal Cove-San Gregorio fault zone. The Bodega Basin may be an extension of the La Honda Basin, but much of the upper Paleogene sediments present in the onshore La Honda Basin are not present in the outcrops and wells in the Point Reyes-Bodega area.

Petroleum Potential.--Ten wells were drilled in the Bodega Basin, beginning in 1963; two wells were drilled in the Ano Nuevo Basin, beginning in 1967, on leases issued in the 1963 OCS lease sale. In both Ano Nuevo wells, drill cuttings throughout the nearly 3,000 feet (900 m) of Monterey formation were coated with free tarry oil, but no drill stem tests were

run. Oil shows were encountered in six of the Bodega Basin wells, one of which was tested, resulting in the recovery of only drilling mud and water.

Some of the earliest oil and gas production in California (circa 1880) came from onshore fields adjoining the Central California Planning Area. The size and number of the fields discovered, however, proved to be small, and the ultimate production from them will probably be less than 10 million barrels of oil and 10 billion cubic feet of gas. Production was derived from reservoirs of Eocene through Pleistocene age.

Whereas the primary source and reservoir rocks in the basins within the planning area are in the Monterey formation of middle and late Miocene age, additional potential hydrocarbon sources and reservoirs exist in shales and sandstones of the younger and older rocks of the sedimentary section. All the basins are oil prone.

Southern California Planning Area

Geology.--The Southern California Planning Area includes the northwest-southeast trending Coast Ranges and Peninsular Range provinces, separated by the east-west trending Transverse Range. For the purposes of resource studies, it is divided into four subareas. One subarea is the offshore Santa Maria Basin, which extends northward from Point Conception to the Central California Planning Area. It is a middle to late Tertiary depositional basin overlying a pre-Tertiary structural high. The second subarea is the Santa Barbara Channel, which is a tectonic depression composed of Quaternary sediments. The Santa Barbara Channel is the submerged southwestern part of the Transverse Range province. The last two subareas, the Inner Basins and Banks and the Outer Basins and Banks, contain numerous basins and banks from south of the Channel Islands to near San Diego and from the Catalina Basin to the west, respectively.

Petroleum Potential.--Whereas oil production began off of southern California in 1896 with the development of the Summerland field in State waters, exploration began in Federal waters in the Santa Maria Basin in 1964 with drilling of exploratory wells following the first Pacific oil and gas lease in sale in May 1963. Twelve fields are located in the onshore portion of the basin, and production activity has begun from Platform Irene in the offshore portion.

32 OCS National Compendium

One COST well was completed in 1978. See table 1-7 below for a detailed listing of COST wells drilled on the Pacific OCS.

Thirteen fields capable of commercial production have been discovered in the Santa Barbara Channel in Federal waters since the drilling began there in 1967. Six fields are currently on production.

Two oil fields have been discovered in San Pedro in the Inner Basins and Banks area of the southern California continental borderland. One COST well drilled in 1975 and nine exploratory wells, commencing in 1976, have been drilled in the Outer Basins and Banks area.

The primary reservoirs in the Santa Monica and San Pedro Basins and the northeastern Santa Barbara Channel are sandstone beds of middle and early Pliocene and late Miocene ages, as is the case in their onshore counterparts, the Los Angeles and Ventura

Basins. Miocene sandstones and fractured fine-grained Monterey siliceous and calcareous reservoirs are the primary targets in most of the southern California continental borderland, in the southern and western Santa Barbara Channel, and in the Santa Maria Basin. Paleogene sandstone reservoirs are additional targets in the Channel and in the outer basins. Whereas Miocene shales, especially the highly organic shales included in the Monterey formation, are the major source rocks of petroleum in southern California, Pliocene and Paleogene shales may also be source rocks.

RESOURCE ESTIMATES FOR THE PACIFIC OCS REGION

Table 1-8 on the next page presents the current undiscovered economically recoverable oil and gas resource estimates for Pacific OCS planning areas.

Table 1-7. COST wells drilled on the Pacific OCS

Planning area/ well number	Lease/block number	Operator	Spud date	Total depth (ft)	Date total depth reached	Report number
OCS-CAL 75-70 No. 1	NI 10-6 Block 463	Exploration Services	08/23/75	10,920	12/02/75	OCS-0237
OCS-CAL 78-164 No. 1	NI 11-10 Block 553	Exploration Services	10/07/78	10,571	12/18/78	OCS-0222

Table 1-8. Estimates of undiscovered economically recoverable oil and gas resources in the Pacific OCS Region as of January 1987

[Oil and BOE in billion barrels; gas in trillion cubic feet]

Planning area	Conditional oil ¹			Conditional gas			MP _{HC} ²	Risky mean oil ³	Risky mean gas	Risky mean BOE ⁴
	95% case	Mean case	5% case	95% case	Mean case	5% case				
Southern California										
Leased and unleased	0.61	1.31	2.23	1.10	3.01	6.24	1.00	1.31	3.01	1.84
Unleased	0.35	0.97	1.73	0.62	2.21	4.81	1.00	0.97	2.21	1.36
Leased	0.12	0.32	0.73	0.28	0.86	2.88	1.00	0.32	0.86	0.47
Central California										
Leased and unleased	0.15	0.50	0.94	0.31	0.82	1.40	0.90	0.45	0.74	0.58
Unleased	0.15	0.50	0.94	0.31	0.82	1.40	0.90	0.45	0.74	0.58
Leased	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Northern California										
Leased and unleased	0.19	0.57	1.02	0.22	1.69	3.05	0.60	0.34	1.01	0.52
Unleased	0.19	0.57	1.02	0.22	1.69	3.05	0.60	0.34	1.01	0.52
Leased	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Washington-Oregon										
Leased and unleased	0.07	0.19	0.30	0.80	1.97	3.11	0.25	0.05	0.49	0.14
Unleased	0.07	0.19	0.30	0.80	1.97	3.11	0.25	0.05	0.49	0.14
Leased	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Pacific Region										
Leased and unleased	0.34	2.10	6.02	1.78	5.17	11.04	1.00	2.10	5.17	3.02

¹Conditional resource estimates are predicated upon the assumption that economically recoverable quantities of hydrocarbons actually exist in the area under consideration.²The marginal probability of hydrocarbons. The probability that economically recoverable hydrocarbons exist in the area under study.³Risky (unconditional) resource estimates reflect the probability that commercial accumulations of hydrocarbons may not exist in the area under consideration.⁴Barrel of oil equivalent (energy basis): the sum of the risky mean gas divided by 5.62 Mcf/bbl and the oil volume. A barrel of oil has an average btu content equivalent 5.62 Mcf of gas.

Note: Three categories of resources (unleased, leased, and total) required three separate PRESTO computer runs for each planning area. In some cases, splitting of prospects into leased and unleased caused portions of the prospects to be subeconomic. Therefore, adding the risky mean quantities for the unleased acreage to risky mean quantities for the leased acreage may not result in the risky mean quantities for the total acreage. However, the total estimate was properly derived by running the PRESTO program for all prospects.

2. OCS Oil and Gas Leasing Program

Lease Sale Process

The Secretary of the Interior has the statutory authority and responsibility to plan for and conduct the offering of leases for OCS acreage as directed in the OCS Lands Act, as amended (43 U.S.C. 1331 et seq.). Within DOI, MMS has primary responsibility for the management of OCS mineral operations. Numerous other State and Federal agencies participate throughout the process. Figure 2-1 on the next page displays each of the steps involved in the pre-lease phase and the parties involved at each step. Detailed information on the procedures of and inputs into the OCS oil and gas leasing program is being compiled in a document entitled *OCS Leasing and Operations Procedures*, which will be available, upon request, from the OCS Information Program.

Five-Year OCS Oil and Gas Leasing Program

Section 18 of the OCS Lands Act (OCSLA) Amendments of 1978 (43 U.S.C. 1344) states that the Secretary of the Interior shall prepare, periodically revise, and maintain an oil and gas leasing program to implement the policies of the OCSLA. The leasing program consists of a schedule of proposed lease sales indicating, as precisely as possible, the size, timing, and location of leasing activity the Secretary determines will best meet national energy needs for the 5-year period following the schedule's approval or reapproval. Before 1978, OCS leasing programs had been issued as a discretionary act of the Secretary of the Interior. To date, three 5-Year OCS Oil and Gas Leasing Programs have been approved by the Secretary under section 18 of the OCSLA, as amended (43 U.S.C. 1344).

The first program was approved in June 1980. That program included 36 sales in 16 OCS planning areas for the period September 1980 through June 1985. These sales were held using the "tract selection" approach. Tract selection sales were based on tract-specific nominations submitted to MMS from the oil and gas industry, and generally offered up to 2 million acres. The actual acreage offered in these

sales depended on the magnitude of the nominations, hydrocarbon potential, and environmental and multiple-use considerations.

The 1980 Five-Year Program was challenged in the U.S. Court of Appeals for the District of Columbia Circuit (*California v. Watt*, 668 F. 2d 1290 (D.C. Cir. 1981), decided October 6, 1981). In its 1981 decision, the court critiqued certain parts of the analysis performed for that program, but allowed leasing to continue and provided guidance for the formulation of the second program, which was then being developed.

Under the 1980 Five-Year Program, MMS held 12 lease sales and offered 12.2 million acres. As a result of these 12 lease sales, the DOI leased 792 tracts, 4.1 million acres, and received \$12.2 billion in high bonus bids.

In July 1982, the second 5-year program developed under section 18 was given final approval by the Secretary. This program scheduled 41 sales in 18 OCS planning areas between August 1982 and June 1987. A number of sales held after April 1983 used a new leasing approach known as "areawide." This approach was designed to offer much more acreage than the previous tract selection method had offered. (For a detailed description of areawide leasing, see the Secretarial Issue Document for the 5-Year OCS Oil and Gas Leasing Program for mid-1987 to mid-1992, dated April 1987. This document is available from the Branch of Offshore Program Development and Planning at the address provided at the end of this section.) Figure 2-2 (p. 37) illustrates the impact of areawide leasing on the number of acres leased by MMS. In 1983, the first year of areawide lease sales, MMS leased over 6.5 million acres, as compared with an average of less than 2 million acres a year leased by tract selection.

The July 1982 Five-Year Program was also challenged in court (*California v. Watt* (II) at 611). In a July 1983 opinion, the U.S. Court of Appeals for the District of Columbia Circuit upheld the Secretary of the Interior's formulation of the 1982-87 program as having fully complied with the OCSLA and the guidance the court set forth in its 1981 opinion.

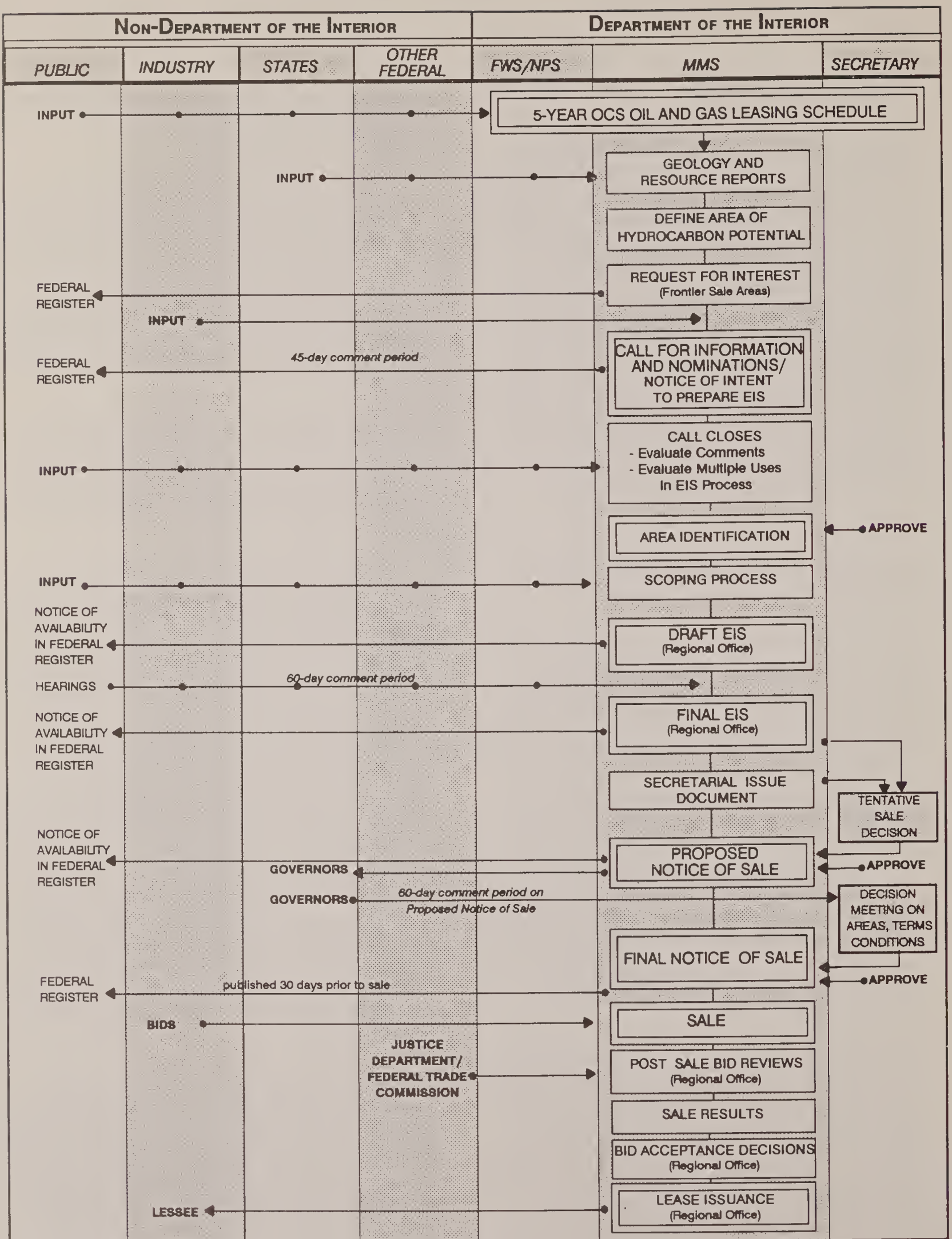


Figure 2-1. Prelease phase of OCS oil and gas leasing process.

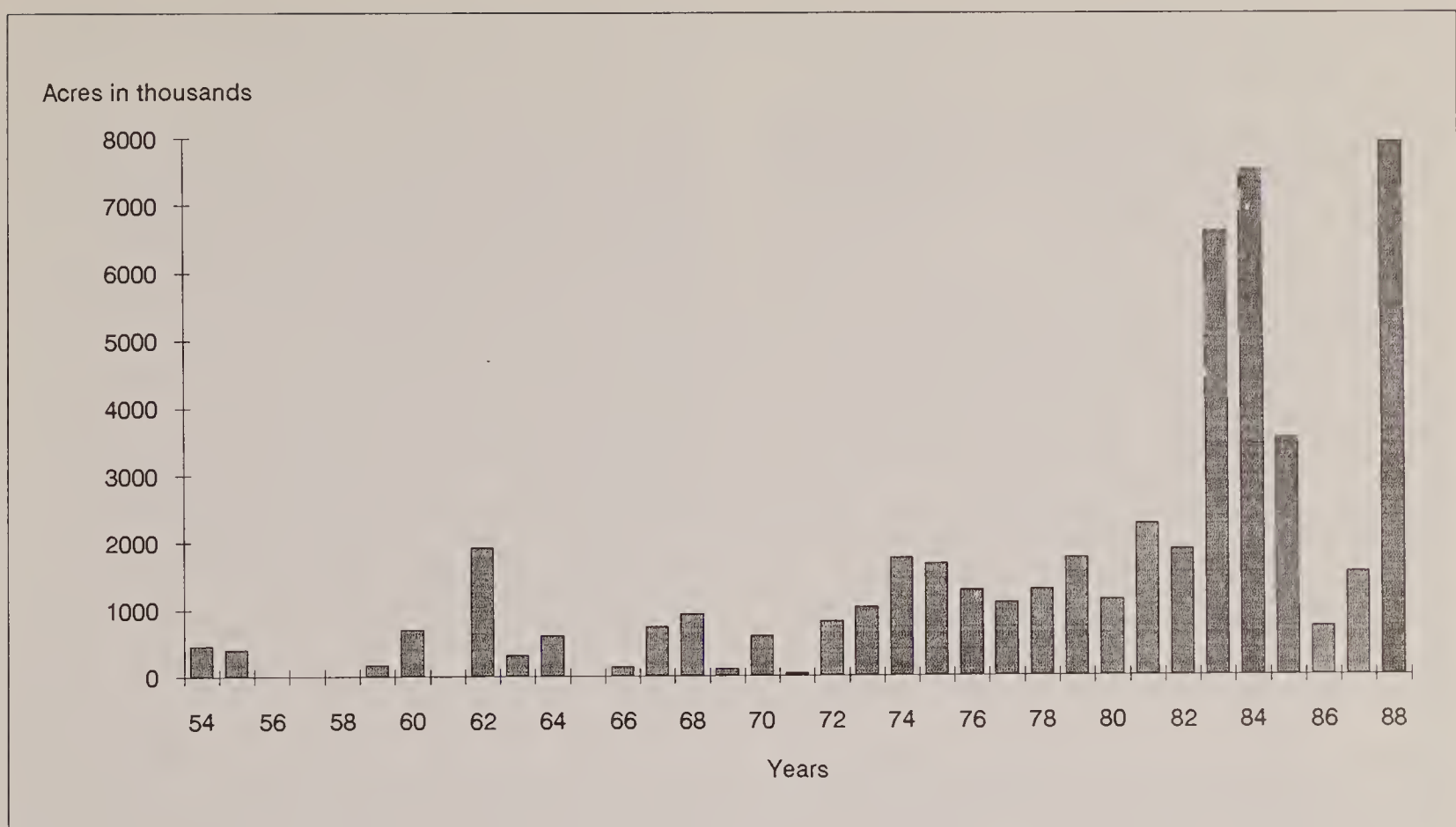


Figure 2-2. Acres leased under tract selection, areawide, and focused leasing programs, 1954 through September 1988.

In January 1984, Secretary Clark instituted a new approach -- "focused leasing" -- which aimed at the early resolution of conflicts by the deletion of acreage with low industry interest but high environmental concern.

Under the July 1982 Five-Year Program, MMS held 23 lease sales and offered 457.4 million acres. Under this program, the DOI leased 3,973 tracts, 21 million acres, and received over \$14.4 billion in high bonus bids. (See Block Versus Tract sidebar.)

On July 2, 1987, the third 5-year program developed under section 18 was given final approval by the Secretary of the Interior. This program, currently in effect, scheduled 35 sales in 21 of the 26 OCS planning areas between mid-1987 and mid-1992. In addition to these 35 sales, 3 small supplemental sales of selected blocks have been scheduled. (See the Supplemental Sales sidebar on the next page for more information.)

Block Versus Tract

A block is defined as a numbered area on an OCS leasing map or official protraction diagram. Blocks are portions of OCS leasing maps and official protraction diagrams that are themselves portions of OCS planning areas. Blocks vary in size, but typical ones are 5,000 to 5,760 acres (approximately 9 square miles). Each block has a specific identifying number, area, and latitude and longitude coordinates that can be pinpointed on a leasing map or official protraction diagram.

A tract is a designation assigned for administrative and statutory purposes to a block or combination of blocks that are identified on a leasing map or official protraction diagram prepared by MMS. A tract may not exceed 5,760 acres unless it is determined that a larger area is necessary to comprise a reasonable economic production unit.

The MMS periodically prepares a leasing milestone chart that projects tentative dates for the various steps for each of the OCS lease sales scheduled under the current 5-year program. The most recent revision of this milestone chart is dated April 1988 (see fig.2-3 on the next page).

Sales conducted under the current program will use a modified leasing approach known as "focusing on promising acreage" to determine the size of lease sales. The DOI uses an extensive consultation and balancing process to offer acreage where OCS leasing would be environmentally sound and would potentially lead to exploration for oil and gas resources. To identify the size of the lease sale area, the DOI uses information and nominations obtained from affected States, local governments, other Federal agencies, the public, and potential bidders, as well as MMS analyses.

In addition to the modifications made to the lease sale process, two significant policy changes made in the past few years will effect the current 5-year program: (1) the addition of a third lease term (see Lease Terms sidebar) and (2) a change in the minimum bid level.

In April 1987, the MMS used the sale-by-sale reconsideration element of the 5-year program to lower the minimum bid for OCS tracts from \$150 per acre to \$25 per acre. The MMS incorporated this policy to encourage exploration and development of the OCS. The oil-price decline of 1985-86 lowered expectations of future oil and gas prices. The lower prices, combined with the large inventory of unexplored leases from previous sales, resulted in a 90 percent decline in the number of acres leased by MMS from 1984 to 1986. As shown in figure 2-2, the number of acres leased by MMS declined from 7.5 million acres in 1984 to less than 1 million acres in 1986. Following the reduction in the minimum-bid level in 1987, along with a stabilization of oil prices, MMS leased over 2 million acres in 1987, and has already leased a record 8 million acres in the first 9 months of 1988.

Supplemental Sales

30 CFR 256.12

Effective September 8, 1988, the MMS regulations provide for the conducting of supplemental OCS lease sales (53 FR 29884). These sales are designed to give the MMS the flexibility to accelerate the leasing process, on the basis of new geological and geophysical data, where there is a need.

Supplemental sales will be limited to (1) blocks for which previously offered bids have been rejected; (2) blocks for which high bids have been forfeited, generally during the previous calendar year; and (3) blocks designated as developmental, including those susceptible to drainage. This designation indicates that a block is located on the same geologic structure as an existing lease having a well with indicated hydrocarbons.

Supplemental sales are designed to be limited in scope and to exclude blocks from the central and western Gulf of Mexico where annual OCS lease sales are conducted. The procedures for supplemental sales are similar to those for regular OCS lease sales.

Lease Terms

Effective December 30, 1985, the Department of the Interior revised its policy on lease terms (50 FR 49041). This revised policy established a new category of leases that carry a primary lease term of 8 years. This policy revision was instituted to compensate offshore operators for the increased expense and time required for exploration of deep-water leases.

Currently, all leases let in water depths of up to 400 meters (1,312 feet) carry a primary term of 5 years; leases let in water depths of from 400 to 900 meters (1,312-2,953 feet) carry a primary term of 8 years; and all leases let in water depths greater than 900 meters (2,953 feet) carry primary terms of 10 years.

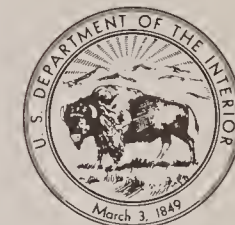
All leases let in water depths between 400 and 900 meters carry a primary term of 5 years with a right of automatic extension to 8 years upon the spudding of an exploratory well within the first 5 years. The exploratory well must be drilled to the depth, and according to other criteria, established in an approved exploration plan.

U.S. DEPARTMENT OF THE INTERIOR 5-YEAR OCS OIL AND GAS LEASING SCHEDULE

APRIL 1988

SALE#	OCS PLANNING AREA	SALE DATE	1987	1988	1989	1990	1991	1992	SALE#
112	W. GULF OF MEXICO	Aug 87	S (HELD 8/12/87)						112
97	BEAUFORT SEA	Mar 88		S (HELD 3/16/88)					97
113	C. GULF OF MEXICO	Mar 88		S (HELD 3/30/88)					113
109	CHUKCHI SEA	May 88	F P G	N S (HELD 5/25/88)					109
115	W. GULF OF MEXICO	Aug 88	F	P G N S (HELD 8/31/88)					115
116	E. GULF OF MEXICO	Nov 88	F	P G N S (HELD 11/16/88)					116
91	N. CALIFORNIA	Feb 89	E H	F P G N S					91
96	N. ATLANTIC	Feb 89	E H	F P G N S					96
118	C. GULF OF MEXICO	Mar 89	DA	E H F P G N S					118
122	W. GULF OF MEXICO	Aug 89	DA	E H F P G N S					122
SU-1	SUPPLEMENTAL SALE	Sep 89		CD I P G N S					SU-1
107	NAVARIN BASIN	Dec 89		E H F P G N S					107
• 121	MID-ATLANTIC	Dec 89	CD A	E H F P G N S					• 121
95	S. CALIFORNIA	Jan 90	CDA	E H F P G N S					95
• 101	ST. GEORGE BASIN	Feb 90	CD A	E H F P G N S					• 101
123	C. GULF OF MEXICO	Mar 90		CD A E H F P G N S					123
125	W. GULF OF MEXICO	Aug 90		CD A E H F P G N S					125
• 114	GOA / COOK INLET	Sep 90	R	CD A E H F P G N S					• 114
SU-2	SUPPLEMENTAL SALE	Sep 90		CD I P G N S					SU-2
117	N. ALEUTIAN BASIN	Oct 90		C DA E H F P G N S					117
• 108	S. ATLANTIC	Oct 90		R CD A E H F P G N S					• 108
124	BEAUFORT SEA	Feb 91		CD A E H F P G N S					124
119	C. CALIFORNIA	Mar 91		CD A E H F P G N S					119
131	C. GULF OF MEXICO	Mar 91		CD A E H F P G N S					131
126	CHUKCHI SEA	May 91		CD A E H F P G N S					126
135	W. GULF OF MEXICO	Aug 91		CD A E H F P G N S					135
SU-3	SUPPLEMENTAL SALE	Sep 91		R CD A E H F P G N S					SU-3
• 120	NORTON BASIN	Sep 91		R CD A E H F P G N S					• 120
137	E. GULF OF MEXICO	Nov 91		CD A E H F P G N S					137
• 129	SHUMAGIN	Jan 92		R CD A E H F P G N S					• 129
• 134	N. ATLANTIC	Feb 92		R CD A E H F P G N S					• 134
128	N. CALIFORNIA	Feb 92		CD A E H F P G N S					128
139	C. GULF OF MEXICO	Mar 92		CD A E H F P G N S					139
132	WASH. - OREG.	Apr 92		R CD A E H F P G N S					132
• 133	HOPE BASIN	May 92		R CD A E H F P G N S					• 133
• 138	S. CALIFORNIA	Jun 92		CD A E H F P G N S					• 138
• 130	NAVARIN BASIN	Jun 92		R CDA E H F P G N S					• 130
• 140	STRAITS OF FLORIDA		(CANCELED SUBJECT TO 3/88 DOI/FLORIDA AGREEMENT)						• 140
SALE#	OCS PLANNING AREA	SALE DATE	1987	1988	1989	1990	1991	1992	SALE#

ABBREVIATIONS:
A Area Identification;
C Call for Information & Nominations;
D Comments on Call Due;
E Draft EIS;
F Final EIS;
G Governor's Comments Due;
H Public Hearings;
I Issue Environmental Assessment for Supplemental Sales;
N Notice of Sale;
P Proposed Notice of Sale;
R Possible Request for Interest;
S Sale



• Frontier Exploration Sale Request for Interest will be issued, if necessary.

Figure 2-3. July 1987 "Final 5-Year OCS Leasing Program" milestone schedule.

As of September 1988, MMS has offered 105.6 million acres in the five OCS lease sales conducted under the current 5-year program. A total of \$1.3 billion has been received in high bonus bids for the 1,817 tracts (9.8 million acres) leased as a result of these sales.

Copies of the July 1987 Five-Year OCS Oil and Gas Leasing Program and associated documents are available from the following address and telephone number:

Branch of Program Development
and Planning, OLMD
Minerals Management Service, MS-645
U.S. Department of the Interior
18th and C Streets, NW.
Washington, D.C. 20240
(202) 343-1072

As the next 5-year OCS oil and gas leasing program is developed, working groups representing the various offshore interests will assist the administration in making policy decisions regarding the leasing and development process and will provide input on the direction of environmental studies. These groups consist of an OCS Advisory Board and its components (the OCS Policy Committee, the Scientific Committee, and the Regional Technical Working Groups).

OCS Advisory Board

The OCS Advisory Board was established in October 1975 to provide DOI with a formal mechanism to receive comments and recommendations from coastal State officials, Federal agencies, and other public and private interests involved in OCS development. Composed of a broad-based panel of experts on the various aspects of the offshore leasing and development process, the board has three key components: the OCS Policy Committee, the Scientific Committee, and the Regional Technical Working Groups. Figure 2-4 on the next page presents an organizational outline of these components.

OCS POLICY COMMITTEE

Through the Director of MMS, the OCS Policy Committee of the OCS Advisory Board provides advice on all aspects of leasing, exploration, development, and

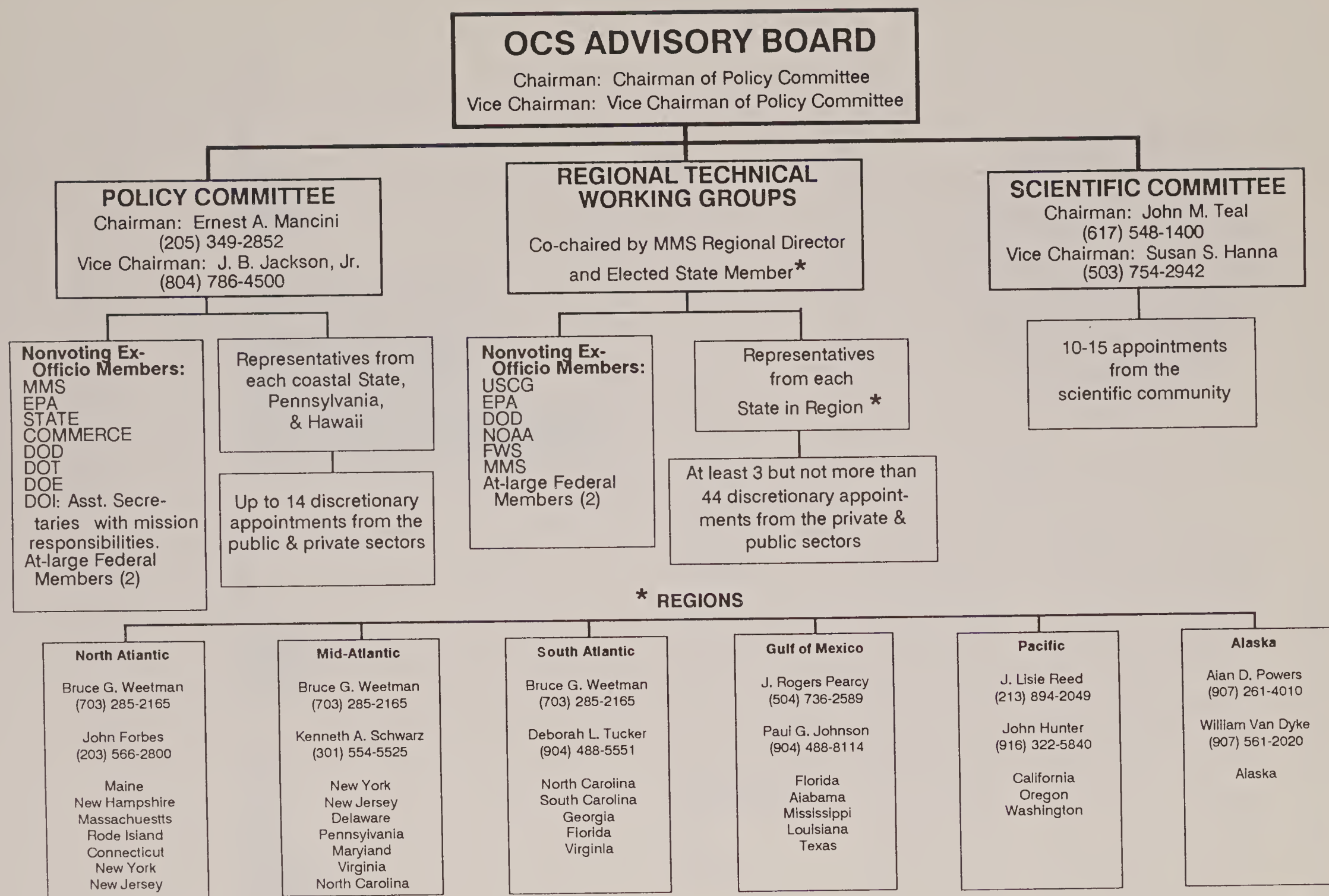
protection of OCS resources to the Secretary of the Interior and other DOI officials. Its membership represents both public and private parties likely to be affected by OCS oil and gas activities. The committee generally meets twice a year or more often when appropriate.

OCS SCIENTIFIC COMMITTEE

The second element of the OCS Advisory Board is the OCS Scientific Committee, which is composed of scientists from disciplines relevant to MMS's Environmental Studies Program. The committee reports directly to the Director of MMS and advises on the appropriateness, feasibility, and scientific value of the Environmental Studies Program. (See page 57 for more information on the Environmental Studies Program.) In addition to the OCS Scientific Committee input, each OCS region holds annual scientific information transfer meetings open to the public to review the ongoing environmental studies in the regions.

REGIONAL TECHNICAL WORKING GROUPS

The Regional Technical Working Groups (RTWG's) are the third component of the OCS Advisory Board. Currently, there are six RTWG's, one each in the Gulf of Mexico, Pacific, and Alaska OCS Regions and one in each of the three Atlantic planning areas. The RTWG's review and comment on technical matters of regional concern regarding prelease and postlease activities and on environmental study requirements for each offshore leasing region. Each RTWG is composed of representatives with technical expertise from the affected States, MMS, other Federal agencies (such as the U.S. Fish and Wildlife Service, the Environmental Protection Agency, the National Oceanic and Atmospheric Administration, the U.S. Coast Guard, the Army Corps of Engineers, and the Department of Energy), the oil and gas industry, and other special and private interests that exist in the leasing region. Every RTWG is co-chaired by the MMS Regional Director or designee and a State representative, who is elected by all the State representatives on the committee (or else the chair is rotated among the State members).



12/88

Figure 2-4. OCS Advisory Board structure.

National Overview of OCS Leasing

Since 1954, the DOI has leased over 53 million acres in 96 lease sales and has received over \$54 billion in high bonus bids. Figure 2-5 breaks these totals down by region. As seen in the figure, the Gulf of Mexico region has received the most interest. This interest is further highlighted by the percentage of the total number of leases currently active on the OCS. Figure 2-6 shows that as of September 30, 1988, the Gulf of Mexico region holds approximately 81 percent of the 6,274 active leases on the OCS.

As discussed in the introduction, the price of crude oil has influenced the U.S. economy since the oil embargo of 1973. This influence can be seen within the OCS leasing program. Figure 2-7 on the next page shows how the price of oil affected the total amount of high bonus bids received per year.

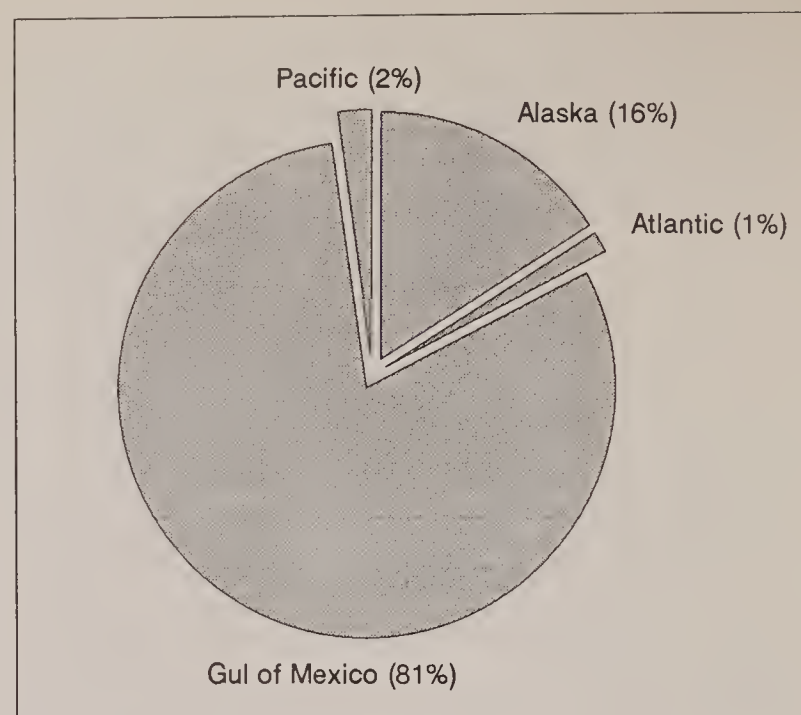


Figure 2-6. Active leases by OCS region as of September 30, 1988.

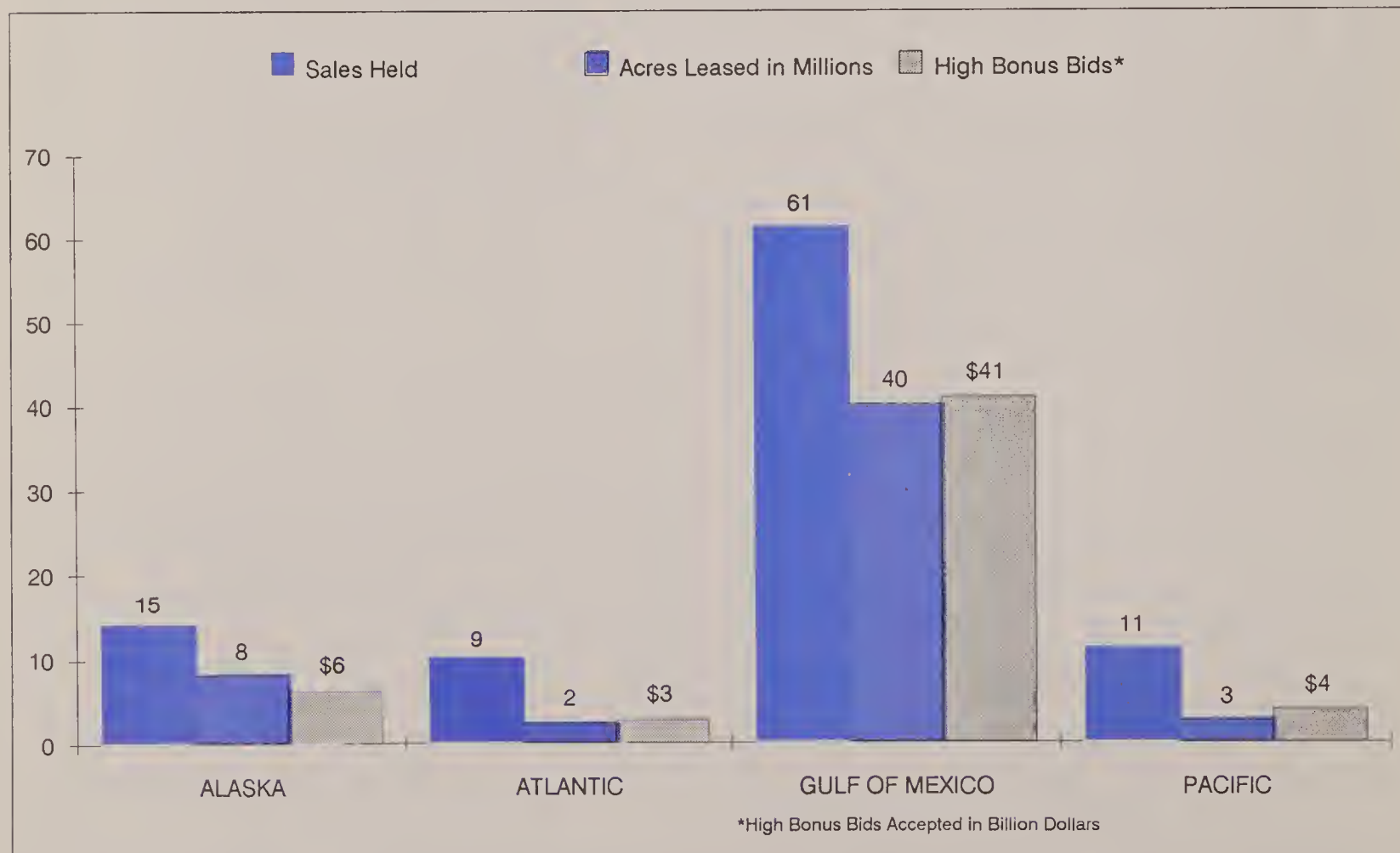


Figure 2-5. Number of sales held, acres leased, and high bonus bids accepted by OCS region, 1954 through September 1988.



[Replaces Figure 2-5 on Page 42]

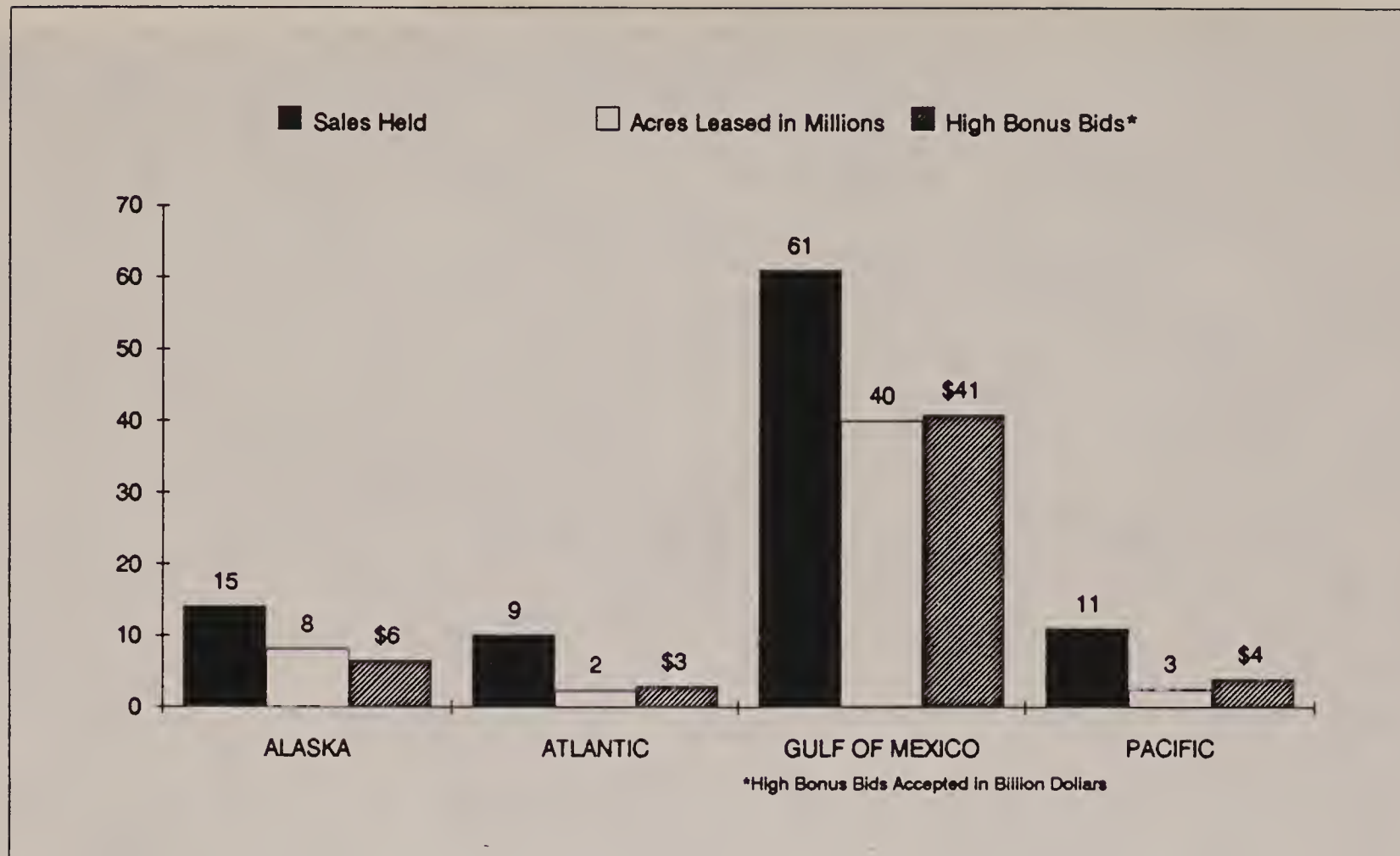


Figure 2-5. *Number of sales held, acres leased, and high bonus bids accepted by OCS region, 1954 through September 1988.*

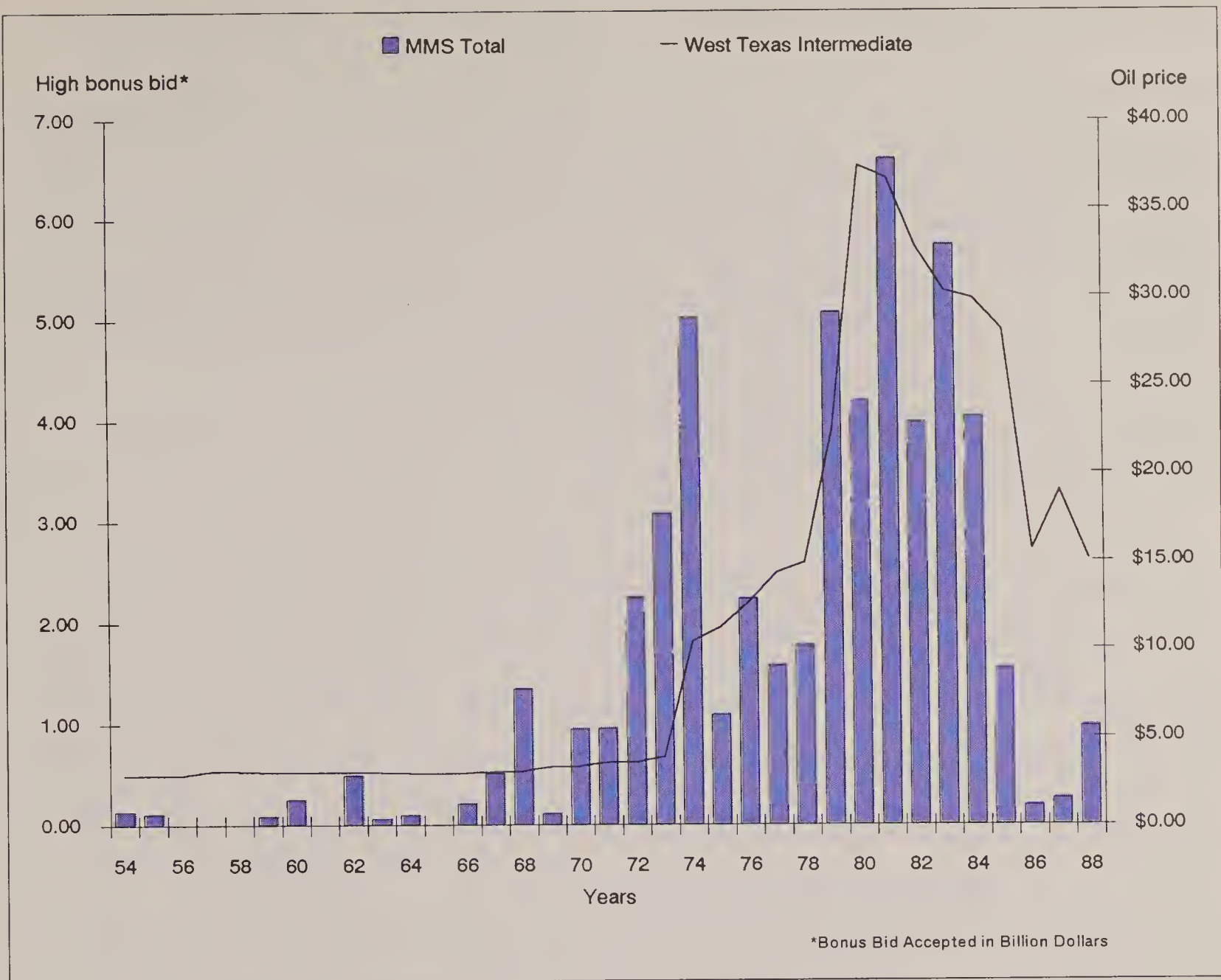


Figure 2-7. Comparison of oil price and high bonus bid accepted, 1954 through September 1988.

Regional Overviews of OCS Leasing

ALASKA OCS REGION

The first lease sale for OCS acreage offshore Alaska was held in 1976. Since that time, a total of 15 sales have been held offering over 98 million acres. The DOI has leased 1,477 tracts (8.1 million acres) and has received over \$6.4 billion dollars in high bonus bids. Specific information on each of the Alaska OCS lease sales is presented in tables 2-1 below and 2-2 on the next page. As of September 1988, there were 996 active leases owned by 41 offshore operators. Figure 2-8 (p. 46) shows the top 10 Alaska OCS leaseholders by percentages of acreage held.

The July 1987 Five-Year OCS Oil and Gas Leasing Program scheduled 12 sales for the Alaska OCS Region. Two of the 12 sales have already occurred; Lease Sale 97 (Beaufort Sea) was held on March 16, 1988, and Lease Sale 109 (Chukchi Sea) was held on May 25, 1988. (See sidebars, p. 46, for the statistics on these sales). Both of these sales were significant in that (1) OCS Lease Sale 97 was the first to be held outside the Gulf of Mexico OCS Region since October 1984 and (2) OCS Lease Sale 109 set several new OCS lease sale records for the Alaska OCS Region, including number of tracts and acres bid on and leased.

Table 2-1. Lease sale history of the Alaska OCS Region through September 1988

Lease sale	Planning area	Date held	Tracts offered	Acres offered (1)	No. of blds rec'd	Tracts leased	Acres leased (1)	Total \$ bonus leased tracts (2)	Average \$ bonus per acre (2)(3)	Existing leases	Exploratory wells drilled
Arctic											
BF	Beaufort Sea	12/11/79	46	173,423	62	24	85,776	488,691,138	5,697	22	7
71	Diapir Field	10/13/82	338	1,825,770	252	121	662,860	2,055,632,336	3,101	96	7
87		08/22/84	1,419	7,773,447	432	227	1,207,714	866,860,327	718	216	5
97		03/16/88	3,344	18,277,436	276	202	1,110,741	114,631,636	103	202	0
109	Chukchi Sea	05/25/88	4,566	25,631,122	653	350	1,976,912	478,032,631	242	350	0
Subtotals			9,713	53,681,198	1,675	924	5,044,003	4,003,848,068		886	19
Bering Sea											
70	St. George	04/12/83	479	2,688,787	150	96	540,917	426,458,830	788	34	10
57	Norton	03/15/83	418	2,379,751	98	59	335,898	317,873,372	946	13	6
83	Navarin	04/17/84	5,036	28,048,995	425	163	927,989	516,317,331	556	63	8
92(4)	North Aleutia	01/13/86	990	5,603,472	31	23	121,754	95,439,500			
Subtotals			6,923	38,721,005	704	341	1,926,558	1,356,089,033		110	24
Gulf of Alaska											
CI	Cook Inlet	10/27/77	135	768,580	240	87	495,307	398,471,313	804	0	10
60		09/29/81	153	858,247	15	13	73,157	4,405,899	60	0	3
RS2		08/05/82	140	785,091	0	0	0	0	0	0	0
39	Gulf of Alaska	04/13/76	189	1,008,499	244	76	409,058	559,836,587	1,369	0	11
55		10/21/80	210	1,195,569	64	35	199,261	109,751,073	551	0	1
RS1		06/30/81	175	996,300	7	1	5,693	170,496	30	0	0
Subtotals			1,002	5,612,286	570	212	1,182,476	1,072,635,368		0	25
TOTAL			17,638	98,014,489	2,949	1,477	8,153,037	6,432,572,469		996	68

(1) Amounts are rounded to nearest acre.

(2) Amounts are rounded to nearest dollar.

(3) Sum of the total bonus for all sales divided by the total acreage of all blocks leased.

(4) This sale had been delayed pending judicial resolution. Sale was conducted 10/11/88.

Note: The data in this table do not cover 17 blocks bid upon in Lease Sale 83, 4 blocks bid upon under Lease Sale 87, nor 16 blocks bid upon in Lease Sale 97. These blocks lie in areas subject to jurisdictional disputes with foreign nations or with the State of Alaska.

Table 2-2. Dates of and Federal Register notices for significant prelease steps for Alaska OCS lease sales through September 1988

Lease Sale number/area	Prelease Steps(1)							
	R	C	A	E	F	P	N	S
87, Diapir Field		11/23/82 47 FR 52782	03/16/83	09/21/83 48 FR 43105	03/16/84 49 FR 9965	03/19/84 49 FR 10189	07/23/84 49 FR 29726 07/31/84 49 FR 30601*	08/22/84
88, Gulf of Alaska/ Cook Inlet		03/16/83 48 FR 11224	06/17/83	01/20/84 49 FR 2550 Request for Supplemental Information 03/30/84 49 FR 12763	07/13/84 49 FR 28630	08/07/84 49 FR 31638		Canceled 05/02/86
89, St. George Basin		04/29/83 48 FR 19481	07/21/83	05/10/84 49 FR 19910	04/17/85 50 FR 15233	05/22/85 50 FR 21202		Canceled 05/02/86
92, North Aleutian Basin		04/29/83 48 FR 19478	07/21/83 03/09/84*	01/17/85 50 FR 2629	09/11/85 50 FR 37061	09/10/85 50 FR 36974	12/16/85 50 FR 51372	Enjoined 01/13/86
85, Barrow Arch		06/27/83 48 FR 29620	09/21/83				Dropped from 5-Yr Schedule	
100, Norton Basin		03/05/84 49 FR 8084	06/26/84	03/19/85 50 FR 11016	12/18/85 50 FR 51610			Canceled 04/11/86
97, Beaufort Sea		09/24/84 49 FR 37532	01/22/85	11/07/86 51 FR 40521 12/03/86 51 FR 43675*	07/06/87 52 FR 25316 02/02/88 53 FR 2891***	08/24/87 52 FR 31823	02/12/88 53 FR 4356 02/29/88 53 FR 6112***	03/16/88
99, Kodiak	10/15/84 49 FR 40228							Canceled 02/20/85
109, Chukchi Sea		01/28/85 50 FR 3870	05/28/85	03/11/87 52 FR 7494	11/25/87 52 FR 45255	12/23/87 52 FR 48580	04/20/88 53 FR 13080 05/10/88 53 FR 16592	05/25/88
86, Shumagin	10/15/84 49 FR 40228 11/06/85 50 FR 46258							Canceled 02/26/86
SU-1, Supplemental Sales								Proposed 09/89
107, Navarin Basin		04/24/84 49 FR 17686 04/28/86 51 FR 15851	07/27/84					Proposed 12/89
101, St. George Basin	06/19/87 52 FR 23418	10/08/87 52 FR 37756	02/02/88					Proposed 02/90
114, Gulf of Alaska	10/31/85 50 FR 45574 01/26/88 53 FR 2208**	05/18/88 53 FR 17902						Proposed 09/90
117, North Aleutian Basin								Proposed 10/90
124, Beaufort Sea		53 FR 35632 09/14/88						Proposed 02/91
126, Chukchi Sea								Proposed 05/91
120, Norton Basin	04/30/87 52 FR 15932 05/15/87 52 FR 18495*							Proposed 09/91
129, Shumagin								Proposed 01/92
133, Hope Basin								Proposed 05/92
130, Navarin Basin								Proposed 06/92

(1) R - Request for Interest
 C - Call for Information & Nominations & Notice of Intent to Prepare an EIS
 A - Area Identification/Tentative Tract Selection (Public Announcement)
 E - Draft EIS (Notice of Availability)
 F - Final EIS (Notice of Availability)
 P - Proposed Notice of Sale (Notice of Availability)
 N - Notice of Sale
 S - Sale

*Correction/revision.
 **Date change.
 ***Amendment

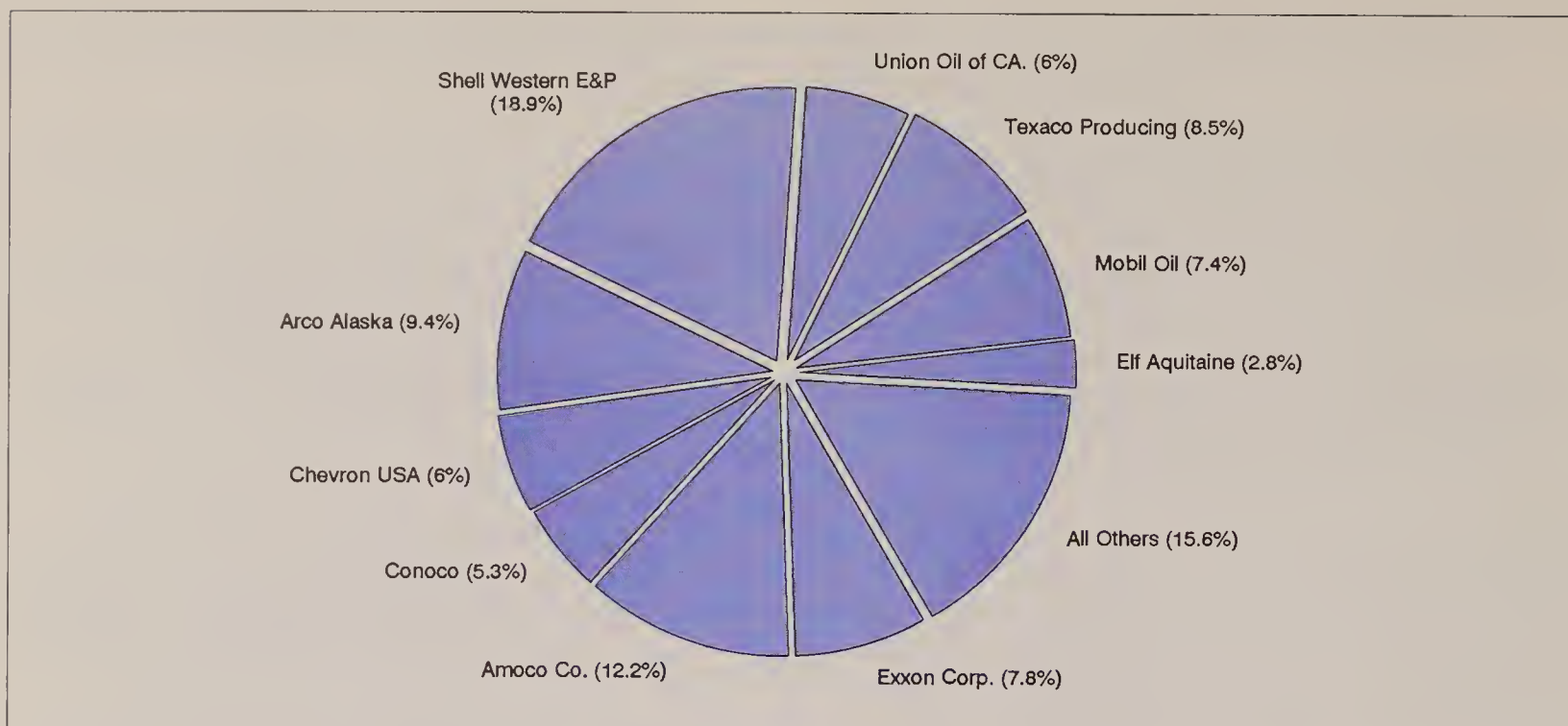


Figure 2-8. Top 10 Alaska OCS leaseholders by percentage of acreage held, September 1988.

Lease Sale 97 Statistics

Sale date	March 16, 1988
Planning area	Beaufort Sea
Number of tracts offered	3,344
Total acreage offered	18,277,436
Number of bids received	276
Number of block receiving bids	218
Total of bonuses from high bids	\$118,574,936
Number of companies bidding	16
Highest bid received	\$23,388,000 for Block 412 NR 6-4 Amoco, et al.
Number of tracts leased	202
Total acreage leased	1,110,741
Total of bonuses from leased tracts	\$114,631,636
Water depths (ft) of tracts receiving bids:	
0 - 150 feet	129
151 - 300 feet	81
301 - 599 feet	8
Deepest block bid on	330 feet Block 212, NR 5-1 Shell

Lease Sale 109 Statistics

Sale date	May 25, 1988
Planning area	Chukchi Sea
Number of tracts offered	4,566
Total acreage offered	25,631,122
Number of bids received	653
Number of block receiving bids	351
Total of bonuses from high bids	\$478,177,948
Number of companies bidding	16
Highest bid received	\$16,138,000 for Block 718 NR 3-2 Shell, et al.
Number of tracts leased	350
Total acreage leased	1,976,912
Total of bonuses from leased tracts	\$478,032,631
Water depths (ft) of tracts receiving bids:	
0 - 150 feet	272
151 - 300 feet	79
Deepest block bid on	225 feet Blocks 373/417 NR 2-8 Shell, et al.

ATLANTIC OCS REGION

Nine OCS lease sales have occurred in the Atlantic OCS Region; the first, Sale 40, was held in 1976. The nine sales offered over 51 million acres, leased 410 tracts, and received over \$2.8 billion in high bonus bids. One of the nine sales, Lease Sale RS-2, reoffered acreage from two previous Atlantic lease sales, South Atlantic Lease Sale 56 and Mid-Atlantic Lease Sale 59. Detailed information on Atlantic OCS lease sales is presented in tables 2-3 below and 2-4 on the next page. Fourteen offshore oil companies owned 78 leases on the Atlantic OCS as of September 30, 1988.

Figure 2-9 (p. 49) shows the top 10 Atlantic OCS leaseholders by percentages of acreage held.

Industry interest in the Atlantic has decreased because of (1) leasing moratoria and numerous subarea deferrals and (2) failure to locate commercial quantities of oil or natural gas. The last lease sale, Sale 78, was held in 1983. The current 5-year program scheduled five sales for the Atlantic OCS Region. One sale, Sale 140, in the Straits of Florida Planning Area has been canceled.

Table 2-3. Lease sale history of the Atlantic OCS Region through September 1988

Lease sale	Sale date	Tracts offered	Acres offered (1)	No. of bids rec'd	Tracts leased	Acres leased (1)	Total bonus leased tracts (2)	Average bonus per acre (2)(3)	Existing leases*	Exploratory wells drilled
North Atlantic										
42	12/18/79	116	660,409	189	63	358,671	\$816,516,546	\$2,277	0	8
	Subtotal	116	660,409	189	63	358,671	\$816,516,546	\$2,277	0	8
Mid-Atlantic										
40	08/17/76	154	876,750	410	93	529,466	\$1,127,936,425	\$2,130	0	27
49	02/28/79	109	620,557	74	39	222,034	\$40,001,631	\$180	0	1
59	12/08/81	253	1,440,376	240	51	290,352	\$323,659,000	\$1,115	8	4
RS-2	08/05/82	155	882,444	19	18	102,477	\$3,920,828	\$38	4	0
76	04/26/83	4,050	22,664,991	53	37	210,641	\$68,410,240	\$325	12	0
	Subtotal	4,721	26,485,118	796	238	1,354,970	\$1,563,928,124	\$1,154	24	32
South Atlantic										
43	03/28/78	224	1,275,273	99	43	244,807	\$100,743,443	\$412	0	6
56*	08/04/81	285	1,621,901	120	47	267,580	\$342,766,174	\$1,281	41	0
RS-2*	08/05/82	232	1,320,819	9	8	45,545	\$2,859,150	\$63	2	0
78*	07/26/83	3,582	20,156,426	12	11	62,625	\$13,362,040	\$213	11	0
	Subtotal	4,323	24,374,419	240	109	620,557	\$459,730,807	\$741	54	6
Total All Sales		9,160	51,519,946	1,225	410	2,334,198	\$2,840,175,477	\$1,217	78	46

(1) Amounts are rounded to nearest acre

(2) Amounts are rounded to nearest dollar

(3) Sum of the total bonus for all sales divided by the total acreage of all blocks leased

* As of March 19, 1982, the boundary between the Mid- and South Atlantic Planning Area changed from lat. 36 deg. 30 min. N. to lat. 35 deg. 00 min. N., resulting in 34 leases being shifted from the South to the Mid-Atlantic Planning Area and affecting previous data for OCS Lease Sales 56 and 78. As a result, active Mid-Atlantic leases total 58 and active South Atlantic leases total 20.

Table 2-4. Dates of and Federal Register notices for significant prelease steps for Atlantic OCS lease sales through September 1988

Lease sale number/area	Prelease steps(1)							
	R	C	A	E	F	P	N	S
40, Mid		40 FR 29 02/11/75 40 FR 59 03/26/75	08/20/75	40 FR 238 12/10/75	41 FR 103 05/26/76		41 FR 138 07/16/76	08/17/76
43, South		40 FR 178 09/12/75	04/27/76	42 FR 32 02/16/77	42 FR 209 10/31/77	42 FR 240 12/14/77 43 FR 13 01/19/78	43 FR 36 02/22/78 43 FR 38 02/24/78	03/28/78
49, Mid		41 FR 226 11/22/76	09/23/77	43 FR 93 05/12/78	43 FR 190 09/29/78	43 FR 223 11/17/78	43 FR 20 01/29/79	02/28/79
42, North		40 FR 117 06/17/75	01/02/76	41 FR 198 10/12/76	42 FR 167 08/29/77 44 FR 100 05/22/79 44 FR 151 08/03/79	42 FR 251 12/30/77 44 FR 145 07/26/79	44 FR 190 09/28/79 44 FR 195 10/05/79 44 FR 223 11/16/79	12/18/79
54, South								Canceled
56, South		44 FR 63 03/30/79	08/02/79	45 FR 134 07/10/80	46 FR 21 02/02/81	46 FR 61 03/31/81	46 FR 127 07/02/81	08/04/81
59, Mid		44 FR 135 07/12/79	12/31/79	45 FR 227 11/21/80	46 FR 99 05/22/81	46 FR 151 08/06/81	46 FR 214 11/05/81	12/08/81
RS-2, South & Mid (2)						47 FR 13984 04/01/82	47 FR 29152 07/02/82	08/05/82
52, North		43 FR 60237 12/26/78 44 FR 118 01/02/79	07/01/80	46 FR 47017 09/25/81	47 FR 18186 04/28/82	47 FR 18806 04/30/82	48 FR 8236 02/25/83	Injunction 03/28/83 Canceled 48 FR 52649 11/21/83
76, Mid		46 FR 47176 09/24/81	04/12/82	47 FR 29013 07/02/82	47 FR 56191 12/15/82	47 FR 57408 12/23/82 48 FR 8863 03/02/83	48 FR 12660 03/25/83 48 FR 14057 04/01/83	04/26/83
78, South		46 FR 19804 03/31/81	04/08/82	47 FR 47470 10/26/82	48 FR 12599 03/25/83	48 FR 12978 03/28/83	48 FR 28946 06/23/83	07/26/83
82, North		47 FR 52786 11/23/82	03/09/83	48 FR 28557 06/22/83	48 FR 52776 11/11/83	49 FR 20408 05/14/84 49 FR 33731 08/24/84	49 FR 33976 08/27/84	Part I - Canceled 09/28/84 Part II - Canceled 01/04/85
90, South		48 FR 23723 05/26/83 49 FR 12761 03/30/84	08/11/83	49 FR 17823 04/25/84	50 FR 3846 01/28/85	11/08/85 sale deferred to 11/86		Canceled
111, Mid		48 FR 48721 10/20/83 50 FR 23081 05/30/85	03/26/84	49 FR 45270 11/15/84	50 FR 23080 05/30/85	11/08/85 sale deferred to 11/86		Canceled
96, North		51 FR 40114 11/04/86 52 FR 5598 02/25/87	05/26/87	53 FR 5471 02/24/88				Proposed (02/89)
121, Mid	52 FR 20166 5/29/87	52 FR 36724 09/30/87	01/15/88					Proposed (12/89)
108, South	53 FR 17767 05/18/88	53 FR 34688 09/07/88						Proposed (10/90)
134, North								Proposed (02/92)
140, Straits of Florida								Canceled

(1) R - Request for Interest

C - Call for Information & Nominations & Notice of Intent to Prepare an EIS

A - Area Identification/Tentative Tract Selection (Public Announcement)

E - Draft EIS (Notice of Availability)

F - Final EIS (Notice of Availability)

P - Proposed Notice of Sale (Notice of Availability)

N - Notice of Sale

S - Sale

(2) Public notification began at P for Sale RS-2.

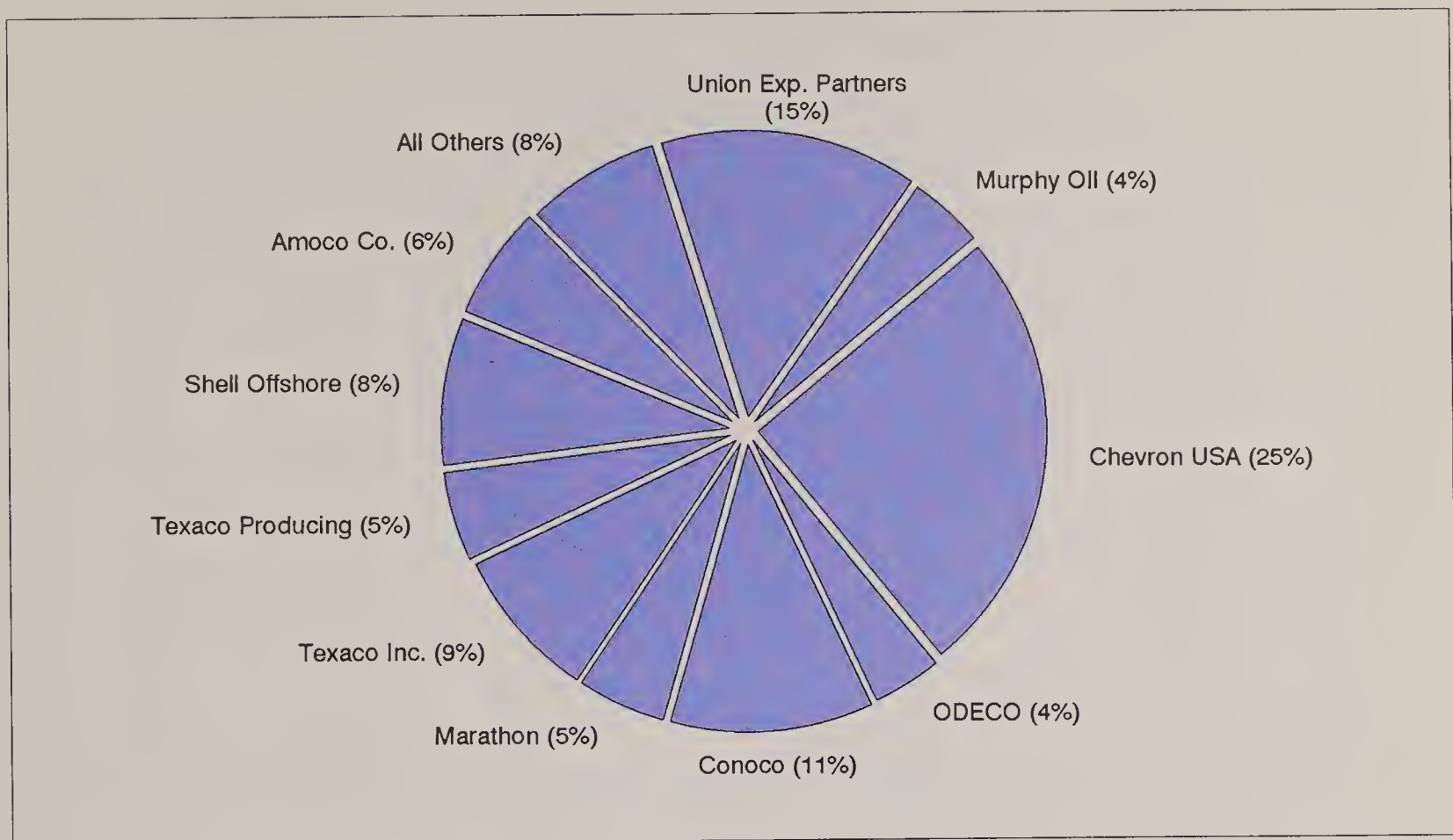


Figure 2-9. *Top 10 Atlantic OCS leaseholder by percentage of acreage held, September 1988.*

GULF OF MEXICO OCS REGION

The Gulf of Mexico OCS Region is the most active region in the offshore leasing program. Since 1954, the Gulf of Mexico OCS Region has held 61 oil and gas lease sales, offered over 487 million acres, and received over \$41 billion dollars in high bonus bids for the 7,927 tracts leased. Table 2-5 on the next page summarizes of all of the oil and gas lease sales held in the Gulf of Mexico OCS Region. In addition to the oil and gas lease sales, the Gulf of Mexico OCS Region has held 2 sulphur lease sales, 2 salt lease sales, and 1 sulphur and salt lease sale. A total of 5,076 leases within the Gulf of Mexico OCS Region were owned by 393 operators as of September 9, 1988. Figure 2-10 (p. 51) shows the top 10 Gulf of Mexico OCS leaseholders by percentages of acreage held.

Twelve OCS lease sales were scheduled under the July 1987 Five-Year Program for the Gulf of Mexico OCS Region. Of these 12 sales, 3 have already been held. Lease Sale 112 was held on August 12, 1987, Lease Sale 113 was held on March 30, 1988, and

Lease Sale 115 was held August 31, 1988. Detailed information on these sales is presented in the Lease Sale Statistics sidebars (p. 51-52). For the remaining sales scheduled for the Gulf of Mexico OCS Region under the current 5-year program, see figure 2-3 (p. 39). Table 2-6 (p. 53) shows the dates of the public notices for the prelease steps that have already occurred for these upcoming sales, as well as past sales.

Specific information on past Gulf of Mexico lease sales can be obtained from the following address and telephone number:

Deputy Chief, Office of Program Services
Gulf of Mexico OCS Office
Minerals Management Service
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394
(504) 736-2617

**Table 2-5. Oil and gas lease sale history of the Gulf of Mexico OCS
Region through September 1988**

Lease sale	Sale area (1)	Sale date	Tracts offered	Acres offered (2)	Number of blds rec'd	Tracts leased	Acres leased (2)	Total \$ bonus leased tracts (3)	Average \$ bonus per acre (3)	Exlstng leases (4)
1	C	10/13/54	199	748,819	336	90	394,721	116,378,476	295	32
2	W	11/09/54	38	111,789	90	19	67,149	23,357,029	348	6
3	C/W	07/12/55	210	674,095	384	121	402,567	108,528,726	270	23
5	E	05/26/59	80	458,000	23	23	132,480	1,711,872	13	0
6	C	08/11/59	38	81,813	56	19	38,820	88,035,120	2,267	7
7	C/W	02/24/60	385	1,610,254	444	147	704,526	282,641,815	401	63
9	C	03/13/62	401	1,808,276	538	206	956,407	177,260,305	185	73
10	C	03/16/62	410	1,875,984	666	205	956,592	268,333,397	281	67
11	C	10/09/62	19	33,855	26	9	16,178	43,887,359	2,713	4
12	C	04/28/64	28	34,028	69	23	32,671	60,340,626	1,847	15
14	C	03/29/66	18	35,993	64	17	35,056	88,845,963	2,534	11
15	C	10/18/66	52	227,898	79	24	104,717	99,164,930	947	10
16	C	06/13/67	206	971,489	743	158	744,456	510,079,178	685	43
18	W	05/21/68	169	728,551	556	110	541,304	593,899,046	1,097	10
19	C	11/19/68	26	46,824	38	16	29,679	149,868,789	5,050	4
19A	C	01/14/69	38	96,389	40	20	48,504	44,037,339	908	6
19B	C	12/16/69	27	93,764	58	16	60,153	66,908,196	1,112	10
21	C	07/21/70	34	73,360	59	19	44,642	97,769,013	2,190	9
22	C	12/15/70	127	593,485	1,043	119	553,898	847,295,760	1,530	56
23	C	11/04/71	18	55,872	33	11	37,222	96,304,523	2,587	6
24	C	09/12/72	78	366,682	324	62	290,321	585,827,925	2,018	11
25	C	12/19/72	132	604,029	690	116	535,874	1,665,519,631	3,108	48
26	C	06/19/73	129	697,643	551	100	547,173	1,591,397,380	2,908	40
32	E	12/20/73	147	817,297	373	87	485,397	1,491,065,231	3,072	2
33	C	03/28/74	206	930,918	402	91	421,218	2,092,510,854	4,968	52
34	W	05/29/74	245	1,355,678	352	102	565,112	1,471,851,831	2,605	46
S1	C/W	07/30/74	258	1,298,739	57	19	100,241	30,236,800	302	3
36	C	10/16/74	287	1,370,031	330	136	634,832	1,427,242,455	2,248	75
36(R)	C	10/16/74	10	51,515	57	8	40,755	1,018,875	25	0
37	W	02/04/75	515	2,870,344	281	113	626,585	274,690,955	438	20
38	C/W	05/28/75	283	1,346,432	191	86	406,942	232,916,050	572	35
38A	C/W	07/29/75	345	1,772,958	179	66	336,301	163,214,006	485	29
41	GOM	02/18/76	132	687,604	81	34	161,286	175,976,493	1,091	13
44	C/W	11/16/76	61	254,488	117	43	178,127	379,148,962	2,129	26
47	GOM	06/23/77	223	1,074,536	424	124	605,427	1,170,093,432	1,933	50
45	C/W	04/25/78	145	709,727	283	90	438,756	733,656,893	1,672	22
65	GOM	10/31/78	89	511,709	62	35	201,295	61,176,730	304	0
51	C/W	12/19/78	128	643,987	288	81	412,416	871,464,998	2,113	36
58	GOM	07/31/79	123	577,517	316	81	391,183	1,247,489,022	3,189	39
58A	GOM	11/27/79	124	588,601	322	90	421,519	1,913,337,938	4,539	31
A62	GOM	09/30/80	192	909,575	506	116	551,654	2,676,927,673	4,853	44
62	GOM	11/18/80	81	458,308	268	67	383,323	1,417,961,511	3,699	23
A66	GOM	07/21/81	212	1,077,931	419	156	799,912	2,649,628,752	3,312	53
66	GOM	10/20/81	209	1,081,364	233	102	508,301	1,243,468,752	2,446	29
67	GOM	02/09/82	234	1,219,847	290	115	590,265	1,193,654,719	2,022	43
69 Pt 1	GOM	11/17/82	144	732,570	151	56	281,213	609,178,223	2,166	25
69 Pt 2	GOM	03/08/83	125	665,478	20	11	58,120	37,570,900	646	4
72	C	05/25/83	7,050	37,867,762	1,015	623	3,089,872	3,367,606,134	1,090	261
74	W	08/24/83	5,848	32,620,248	773	406	2,246,005	1,501,712,517	668	122
79	E	01/05/84	8,868	50,631,513	226	156	897,786	310,586,261	346	146
81	C	04/24/84	6,502	34,743,780	793	453	2,278,179	1,323,036,649	581	401
84	W	07/18/84	5,446	30,038,593	593	361	1,949,213	844,850,488	433	289
98	C	05/22/85	4,531	24,006,157	644	409	2,076,908	1,079,377,760	520	401
102	W	08/14/85	4,879	27,199,074	265	195	1,075,189	359,175,656	334	192
94	E	12/18/85	6,344	35,823,478	114	66	377,228	103,793,098	275	77
104	C	04/30/86	5,837	31,382,152	129	101	504,814	130,276,757	258	101
105	W	08/27/86	4,887	27,287,952	52	41	229,613	56,817,990	247	41
110	C	04/22/87	5,881	31,818,472	385	293	1,539,626	262,971,486	171	291
112	W	08/12/87	5,045	27,943,606	519	347	1,908,199	234,275,520	116	347
113	C	03/30/88	6,229	33,580,661	931	662	3,416,759	388,730,457	114	662
115	W	08/31/88	5,053	27,911,790	370	255	1,412,764	125,352,889 *	89	255
Grand Total All Sales			89,780	487,891,284	19,721	7,927	39,877,445	41,261,438,115		4,840

(1) C = Central Gulf of Mexico Planning Area; W = Western Gulf of Mexico Planning Area; E = Eastern Gulf of Mexico Planning Area;
C/W = Central & Western Planning Area; GOM = Entire Gulf of Mexico

(2) Amounts are rounded to nearest acre.

(3) Amounts are rounded to nearest dollar.

(4) Total does not include existing sulphur and salt leases.

* This figure includes one-fifth bonus deposits (totaling \$67,131) forfeited on two tracts for which no leases were issued.

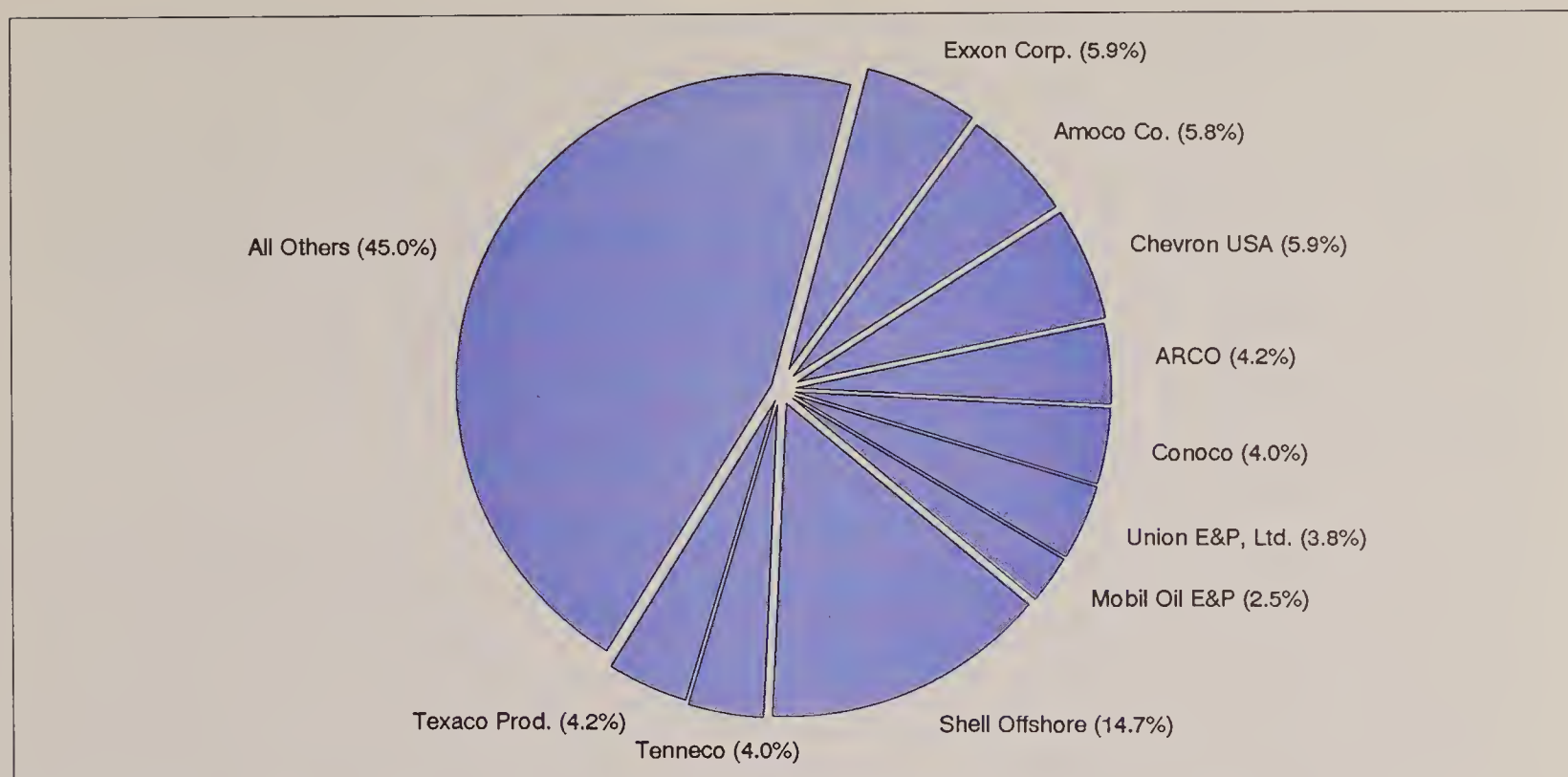


Figure 2-10. Top 10 Gulf of Mexico OCS leaseholders by percentage of acreage held, September 1988.

Lease Sale 112 Statistics

Sale date	August 12, 1987
Planning area	Western
Number of tracts offered	5,045
Total acreage offered	27,943,606
Number of bids received	519
Number of tracts receiving bids	367
Total of bonuses from high bids	\$242,796,331
Number of companies bidding	63
Highest bid received	\$8,348,000 for East Breaks 688
Number of tracts leased	347
Total acreage leased	1,908,199
Total of bonuses from leased tracts	\$234,275,520
Water depths (ft) of tracts receiving bids:	
less than 400 meters	224
(1,312 feet)	
400-900 meters	16
(1,312-2,953 feet)	
greater than 900 meters	107
(2,953 feet)	
Deepest block bid on	10,000 feet Alaminos Canyon 998 and 999

Lease Sale 113 Statistics

Sale date	March 30, 1988
Planning area	Central
Number of tracts offered	6,229
Total acreage offered	33,580,661
Number of bids received	931
Number of tracts receiving bids	684
Total of bonuses from high bids	\$404,612,164
Number of companies bidding	84
Highest bid received	\$18,215,000 for West Cameron 248
Number of tracts leased	662
Total acreage leased	3,416,759
Total of bonuses from leased tracts	388,730,457
Water depths (ft) of tracts receiving bids:	
less than 400 meters	369
(1,312 feet)	
400-900 meters	44
(1,312-2,953 feet)	
greater than 900 meters	249
(2,953 feet)	
Deepest block bid on	9,000 ft Walker Ridge 811

Lease Sale 115 Statistics

Sale date	August 31, 1988
Planning area	Western
Number of tracts offered	5,053
Total acreage offered	27,911,790
Number of bids received	370
Number of tracts receiving bids	270
Total of bonuses from high bids	\$130,785,464
Number of companies bidding	62
Highest bid received	\$7,523,981 for High Island South Addition A562
Number of tracts leased	255
Total acreage leased	1,412,764
Total of bonuses from leased tracts	\$125,352,889*
Water depths (ft) of tracts receiving bids:	
less than 400 meters (1,312 feet)	222
400-900 meters (1,312-2,953 feet)	12
greater than 900 meters (2,953 feet)	36
Deepest block bid on	5,578 feet Garden Banks 833, 877, and 931
*This figure includes one-fifth bonus deposits (totaling \$67,131) forfeited on two tracts for which no leases were issued.	

The Gulf of Mexico OCS Region held a sulphur and salt lease sale in February 1988. This was the fifth such sale but the first since 1969. Leases acquired in this sale provide opportunities for industry to explore for and mine elemental sulphur from salt-dome cap rocks. Table 2-6 on the next page provides more information on the public steps that MMS followed in conducting the sulphur and salt lease sale. The Sulphur & Salt Lease Sale sidebar below presents specific information on the results of the sale.

Sulphur & Salt Lease Sale

Sale date	Feb. 24, 1988
Planning area	Central
Number of tracts offered	51
Total acreage offered	593,971
Number of bids received	20
Number of bidding units receiving bids	14
Total of bonuses from high bids	\$15,149,327
Number of companies bidding	5
Highest bid received	\$3,401,757
Number of bidding units leased	14
Total acreage leased	142,685
Total of bonuses from leased tracts	\$15,149,327

Table 2-6. Dates of and Federal Register notices for significant prelease steps for Gulf of Mexico OCS lease sales, January 1980 through September 1988

Lease sale number/area	Prelease steps(1)						
	C	A	E	F	P	N	S
69, Gulf of Mexico	45 FR 5405 01/23/80 45 FR 7317* 02/01/80 45 FR 8730*** 02/08/80	06/04/80	46 FR 18604 03/25/81	46 FR 44517 09/04/81	47 FR 28018 06/28/82	(Pt. I) 47 FR 46459 10/18/82 (Pt. II) 48 FR 5314 02/04/83	11/17/82
72, Central	46 FR 7078 01/22/81	10/29/81	47 FR 36296 08/19/82	48 FR 745 01/06/83	48 FR 999 01/07/83	48 FR 15782 04/12/83	05/25/83
74, Western	46 FR 7078 01/22/81	10/29/81	47 FR 36296 08/19/82	48 FR 745 01/06/83	48 FR 15093 04/06/83	48 FR 31565 07/08/83	08/24/83
79, Eastern	--	10/19/81	47 FR 36296 08/19/82	48 FR 745 01/06/83	48 FR 28961 06/23/83	48 FR 54787 12/06/83	01/05/84
81, Central	47 FR 42691 09/28/82	--	48 FR 31303 07/07/83	48 FR 55343 12/12/83	48 FR 55975 12/16/83	49 FR 11105 03/23/84 (Pt. 1)	04/24/84
84, Western	47 FR 42691 09/28/82	--	48 FR 31303 07/07/83	48 FR 55343 12/12/83	49 FR 7191 02/27/84	49 FR 24671 06/14/84	07/18/84
98, Central	48 FR 40799 09/09/83	04/16/84	49 FR 32268 08/13/84	50 FR 355 01/03/85	50 FR 670 01/04/85	50 FR 15832 04/22/85	05/22/85
102, Western	48 FR 40799 09/09/83	04/16/84	49 FR 32268 08/13/84	50 FR 355 01/03/85	50 FR 11801 03/25/85	50 FR 27798 07/05/85	08/14/85
94, Eastern	48 FR 40799 09/09/83	04/16/84	49 FR 32268 08/13/84	50 FR 355 01/03/85	50 FR 32528 08/12/85	50 FR 47510 11/18/85	12/18/85
104, Central	49 FR 24807 06/15/84	10/03/84	50 FR 19495 05/08/85	50 FR 46188 11/06/85	50 FR 50736 12/11/85	51 FR 10726 03/28/86	04/30/86
105, Western	49 FR 24807 06/15/84	10/03/84	50 FR 19495 05/08/85	50 FR 46188 11/06/85	51 FR 11504 04/03/86	51 FR 26644 07/24/86	08/27/86
110, Central	50 FR 26054 06/24/85	09/23/85	51 FR 16902 05/07/86	51 FR 40082 11/04/86	51 FR 43249 12/01/86	52 FR 7536 03/11/87	04/22/87
112, Western	50 FR 26054 06/24/85	09/23/85	51 FR 16902 05/07/86	51 FR 40082 11/04/86	52 FR 8116 03/16/87	52 FR 25158 07/02/87	08/12/87
Salt & Sulphur, Central	51 FR 37128 10/17/86	12/30/87		52FR 242*** 06/29/87	52 FR 34346 09/10/87	52 FR 48650 12/23/87	02/24/88
113, Central	51 FR 19042 05/23/86	08/22/86	52 FR 15995 05/01/87	52 FR 38282 10/15/87	52 FR 44230 11/18/87 52FR 48883** 12/28/87 53 FR 597* 01/08/88	53 FR 4334 02/12/88	03/30/88
115, Western	51 FR 19042 05/23/86	08/22/86	52 FR 15995 05/01/87	52 FR 38282 10/15/87	53 FR 8515 03/15/88	53 FR 25958 07/08/88	08/31/88
116, Eastern	51 FR 19042 05/23/86	08/22/86	52 FR 15995 05/01/87	52 FR 38282 10/15/87	53 FR 23159 06/20/88	53 FR 38674 09/30/88	11/16/88
118, Central	52 FR 21210 06/04/87	08/28/87	53 FR 10299 03/30/88 53 FR 13332* 04/22/88	53 FR 33553 08/31/88	53 FR 38364 09/30/88		Proposed (03/89)
122, Western	52 FR 21210 06/04/87	08/28/87	53 FR 10299 03/30/88 53 FR 13332* 04/22/88	53 FR 33553 08/31/88			Proposed 08/89
123, Central	53 FR 18034 05/19/88	07/88					Proposed 03/90
125, Western	53 FR 18034 05/19/88	07/88					Proposed 08/90

(1) C - Call for Information & Nominations & Notice of Intent to Prepare an EIS

A - Area Identification/Tentative Tract Selection (Public Announcement)

E - Draft EIS (Notice of Availability)

F - Final EIS (Notice of Availability)

P - Proposed Notice of Sale (Notice of Availability)

N - Notice of Sale

S - Sale

* Correction/revision.

** Amendment

***Environmental Assessment

PACIFIC OCS REGION

Over the past 25 years, the Pacific OCS Region has held 11 lease sales offering over 9.7 million acres. Over \$3.9 billion in high bonus bids was received for the 470 tracts (2.5 million acres) leased as a result of these sales. Detailed information on Pacific OCS lease sales is presented in table 2-7 below. A total of 135 leases were owned in the Pacific OCS Region as of September 30, 1988. Figure 2-11 on the next page displays the top 10 leaseholders in the Pacific OCS Region by percentages of acreage held.

The current 5-year program has six lease sales scheduled for the Pacific OCS Region. Five sales are proposed offshore California, and one sale is proposed offshore Washington and Oregon. As is the case in the Atlantic Region, extensive subarea deferrals have been made in the OCS planning areas offshore California as a result of 5-year program decisions. A congressionally imposed moratorium, through the appropriations process, continues to affect lease sales offshore northern California. Table 2-8 (p. 56) shows the dates of the public notices for the prelease steps that have already occurred for these upcoming sales, as well as past sales.

Table 2-7. Lease sale history of the Pacific OCS Region through September 1988

Lease sale	Sale date	Sale type (1)	Tracts offered	Acres offered (2)	Number of bids rec'd	Tracts leased	Acres leased (2)	Total \$ bonus leased tracts (3)	Average \$ bonus per acre (3)(4)	Existing leases	Exploratory wells drilled
Washington-Oregon											
P2	10/01/64	G	196	1,090,074	222	101	580,853	35,533,701	61	0	12
Subtotals			196	1,090,074	222	101	580,853	35,533,701	61	0	12
Central & Northern California											
P1	05/14/63	G	129	669,777	70	57	312,945	12,807,337	41	0	20
Subtotals			129	669,777	70	57	312,945	12,807,337	41	0	20
Southern California											
P3	12/15/66	D	1	1,995	7	1	1,995	21,189,000	10,621	1	6
P4	02/06/68	G	110	540,609	164	71	363,181	602,719,262	1,660	34	142
35	12/11/75	G	231	1,257,593	166	56	310,049	417,312,141	1,346	4	41
48	06/29/79	G	148	792,845	112	54	288,260	572,825,418	1,987	13	32
53*	05/28/81	G	111	603,613	301	60	320,579	2,047,800,089 (b)	6,388	43	55
68	06/11/82	G	140	716,866	66	29	147,066	117,875,281	802	15	13
RS-2(a)*	08/05/82	G	27	153,716	19	10	56,932	4,369,472	77	2	1
73*	11/30/83	G	137	768,341	14	8	43,801	16,022,336	366	4	0
80	10/17/84	G	657	3,147,352	30	23	114,367	62,121,252	543	19	0
Subtotals			1,562	7,982,930	879	312	1,646,230	3,862,234,251	2,346	135	290
Totals			1,887	9,742,781	1,171	470	2,540,028	3,910,575,289	1,540	135	322

(1) G = general oil and gas lease sale; D = drainage oil and gas lease sale

(2) Amounts are rounded to nearest acre.

(3) Amounts are rounded to nearest dollar.

(4) Sum of the total bonus for all sales divided by the total acreage of all blocks leased.

(a) Lease Sale RS-2 statistics given only for tracts in the Pacific OCS Region.

(b) The one-fifth bonuses (totaling \$41,081,734) on 12 leases were forfeited by the companies in May 1984. This amount is not included in total bonus figure.

* Planning Area at time of sale was called Central and Northern California; all are now within "Southern California" Planning Area.

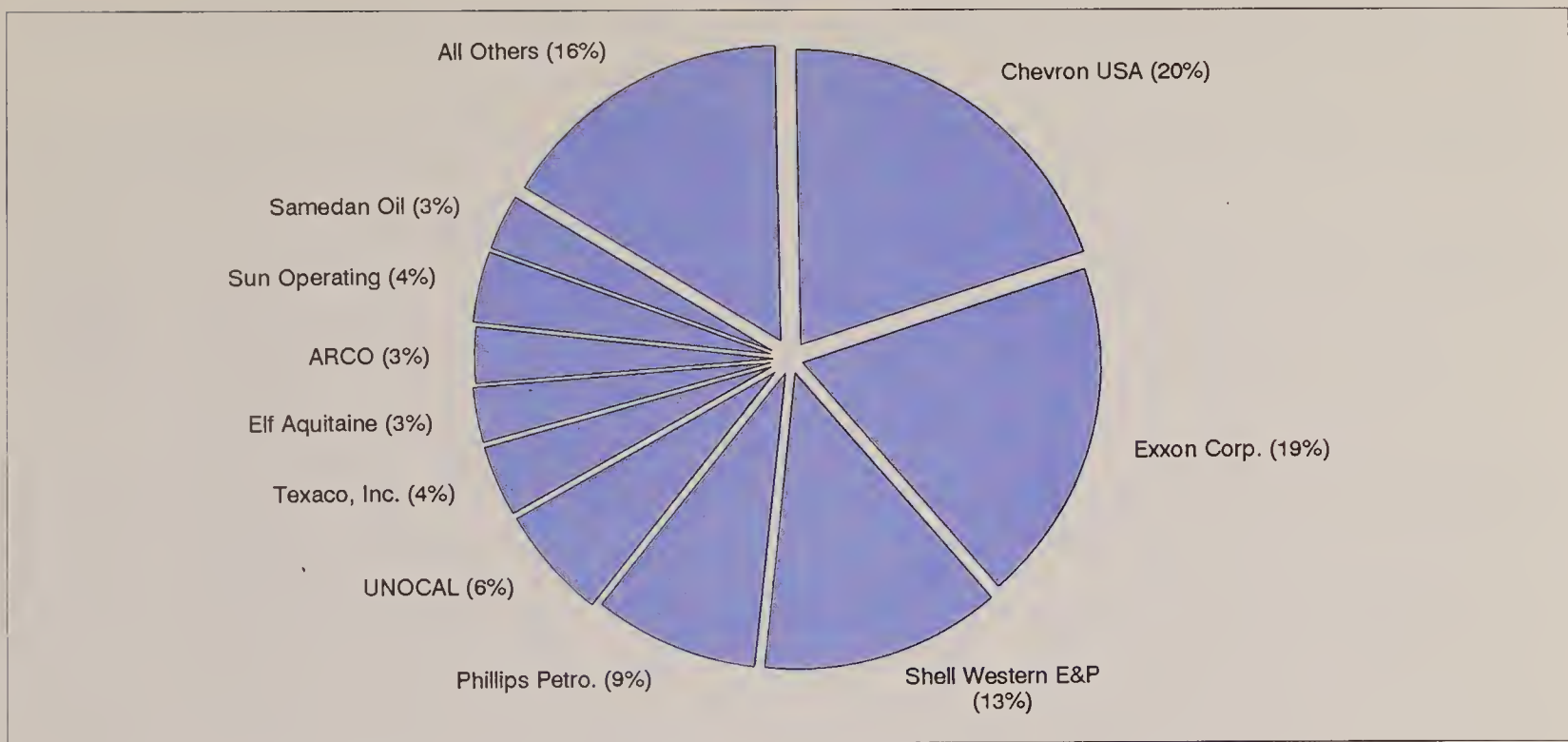


Figure 2-11. *Top 10 Pacific OCS leaseholders by percentage of acreage held, September 1988.*

Table 2-8. Dates of and Federal Register notices for significant prelease steps for Pacific OCS lease sales through September 1988

Lease sale number/area	Prelease steps(1)							
	R	C	A	E	F	P	N	S
P1, California		27 FR 867 01/30/62					27 FR 9734 10/02/62 27 FR 12228 12/11/62 28 FR 2288 03/08/63 28 FR 2509 03/14/63 28 FR 3218 04/03/63	Canceled 01/08/63 Canceled 03/13/63 Canceled 04/11/63 05/14/63
P2, Washington-Oregon		28 FR 8328 08/14/63	02/19/64				29 FR 2562 02/19/64 29 FR 3819 03/27/64	10/01/64
P3, Southern			11/11/66				31 FR 14534 11/11/66	12/15/66
P4, Southern		31 FR 16629 12/29/66	12/28/67				32 FR 20884 12/28/67	02/06/68
35, Southern		39 FR 4934 02/08/74	08/12/74	40 FR 15917 04/08/75	40 FR 34425 08/15/75		40 FR 51672 11/06/75 40 FR 52070 11/07/75 40 FR 52421 11/10/75 40 FR 55871 12/02/75	12/11/75
		39 FR 4934 02/08/74			40 FR 215 11/06/75			
48, Southern		41 FR 29440 07/16/76	01/18/77	43 FR 38944 08/31/78	44 FR 6213 01/31/79	44 FR 17583 03/22/79	44 FR 30770 05/29/79 44 FR 32048 06/04/79	06/29/79
53, Central		42 FR 60794 11/29/77	44 FR 26215 05/04/79	45 FR 26478 04/18/80	45 FR 58979 09/05/80	45 FR 71139 10/27/80 46 FR 12435 02/13/81	46 FR 23673 04/27/81	05/28/81
68, Southern		44 FR 76867 12/28/79	45 FR 84878 12/30/80	46 FR 28951 05/29/81 46 FR 33110 06/26/81	46 FR 57763 11/25/81	47 FR 5177 02/03/82	47 FR 20517 05/12/82	06/11/82
RS-2, Central						47 FR 13983 04/01/82 47 FR 14961 04/07/82	47 FR 29151 07/02/82	08/05/82
73, Central		45 FR 79401 11/28/80	05/05/82	48 FR 9951 03/09/83	48 FR 29959 06/29/83	48 FR 31577 07/08/83 48 FR 36910 08/15/83	48 FR 50007 10/28/83	11/30/83
80, Southern		47 FR 52790 11/23/82	02/28/83	48 FR 29067 06/24/83	48 FR 54906 12/07/83	49 FR 22740 05/31/84	49 FR 36475 09/17/84	10/17/84
91, Northern		51 FR 5496 02/13/86	07/16/86	52 FR 47764 12/16/87				Proposed 02/89
95, Southern		52 FR 3881* 02/06/87 52 FR 25956 07/09/87						Proposed 09/89
119, Central								Proposed 11/90
128, Northern								Proposed 02/92
132, Washington-Oregon**								Proposed 04/92
138, Southern								Proposed 06/92

(1) R - Request for Interest
 C - Call for Information & Nominations & Notice of Intent to Prepare an EIS
 A - Area Identification/Tentative Tract Selection (Public Announcement)
 E - Draft EIS (Notice of Availability)
 F - Final EIS (Notice of Availability)
 P - Proposed Notice of Sale (Notice of Availability)
 N - Notice of Sale
 S - Sale

* Request for comments on Mitigating Measures.
 ** Frontier Exploration Sale.

Environmental Studies Program

The present MMS Environmental Studies Program (ESP) was initiated by the Bureau of Land Management, with contracts awarded for the collection and synthesis of environmental and socioeconomic information for OCS leasing areas and the adjacent onshore coastal environments. From 1973 through 1988, the MMS and its predecessor agency have invested \$472 million on its ESP. Initially, the program was designed for conducting large-scale multidisciplinary baseline studies to document a variety of measurable characteristics of biological communities, the water column, and the seafloor of study areas before any OCS oil and gas activity in that area. These studies characterized the nature, abundance, and diversity of natural animal and plant populations, the physical characteristics of the seafloor and overlying marine waters, and the concentrations of certain trace metals and hydrocarbons in the water, sediments, and selected animals in the study areas.

The baseline or benchmark studies, in concept, were followed by monitoring studies to provide information on environmental changes relative to the baseline data as OCS activities began in each area. During the years 1974-78, the ESP sponsored baseline/benchmark studies designed from an information base that was developed from literature summaries and syntheses and supplemented with special studies for selected sites or discrete topics of special interest. During the years 1976-77, the program received its highest level of funding because studies were being initiated in the Alaska and Atlantic OCS Regions, two frontier OCS areas, in preparation for the first oil and gas lease sales in both regions (see fig. 2-12 on the next page). (Fig. 2-12 provides an annual breakdown of the level of ESP funding received by each region from 1973 to 1988. Figure 2-13 (p. 59) shows the percentage of the program's total 1973-1988 funding received by each OCS region and by DOI headquarters in Washington, D.C.) With 10 of the then 18 planning areas located in the Alaska OCS Region, nearly one-half of the ESP's funding has gone to that region.

In late 1978, the program was redirected; the National Research Council, contracted by DOI, assessed the program and recommended changes. The ESP was then oriented toward more immediate and

useable results for leasing and lease-management decisions. A framework was developed for prioritizing study needs, and annual Regional Studies Plans were initiated. This framework is still used in the MMS regional ESP.

From 1978 through 1985, the program's content was fairly consistent. Individual studies varied from year to year and regional emphasis changed, but there was little programmatic restructuring. Considerable emphasis was placed on field studies in physical oceanography and marine biology (1) to characterize the ecological resources at risk in the various planning areas and (2) to provide the data necessary for circulation modeling, which also received considerable support. Toxicity studies were undertaken primarily to define lethal effects of both petroleum compounds and operational discharges from drilling rigs or production platforms. Monitoring programs were developed or initiated by all four regional offices to determine the extent of operational impacts. Endangered species, marine mammals, and seabirds also received considerable attention. In Alaska, social and economic studies were also a significant part of the program.

At present, the ESP includes a wide variety of study approaches, including descriptive regional reconnaissance studies, site- or area-specific studies, monitoring programs, information gathering and syntheses, and environmental process studies. The type of data and information gathered varies from study to study, but generally includes descriptive or quantitative characterizations of (1) the seafloor and associated biological communities; (2) the nature and dynamics of water masses and their movement; (3) chemical constituents or contaminants of water, sediments, or organisms; (4) endangered or threatened species populations and their vulnerability to adverse impacts; (5) coastal socioeconomic structure and function and probable changes caused by OCS oil and gas activities; and (6) actual or potential cultural resource sites on the OCS. Efforts are also funded to manage available data and to provide information to interested parties.

Figure 2-14 (p. 60) shows the total level of funding from 1973 through 1988, by study discipline, for each OCS region and for DOI headquarters in Washington, D.C. The highest funded categories for the program through 1988 were biology, physical oceanography, geology, and baseline studies.

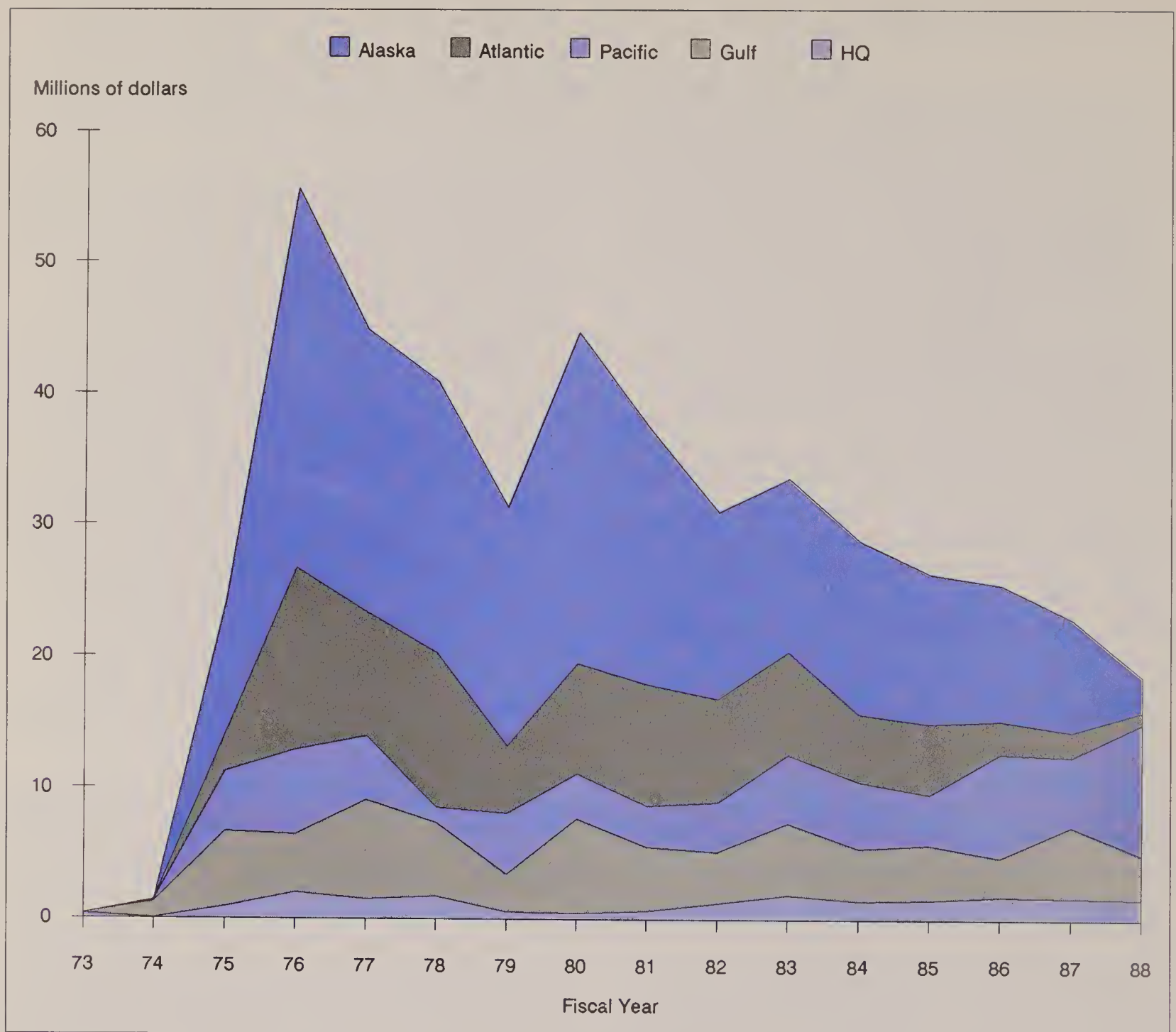


Figure 2-12. OCS Environmental Studies Program annual level of funding by OCS Region, 1973 through September 1988.

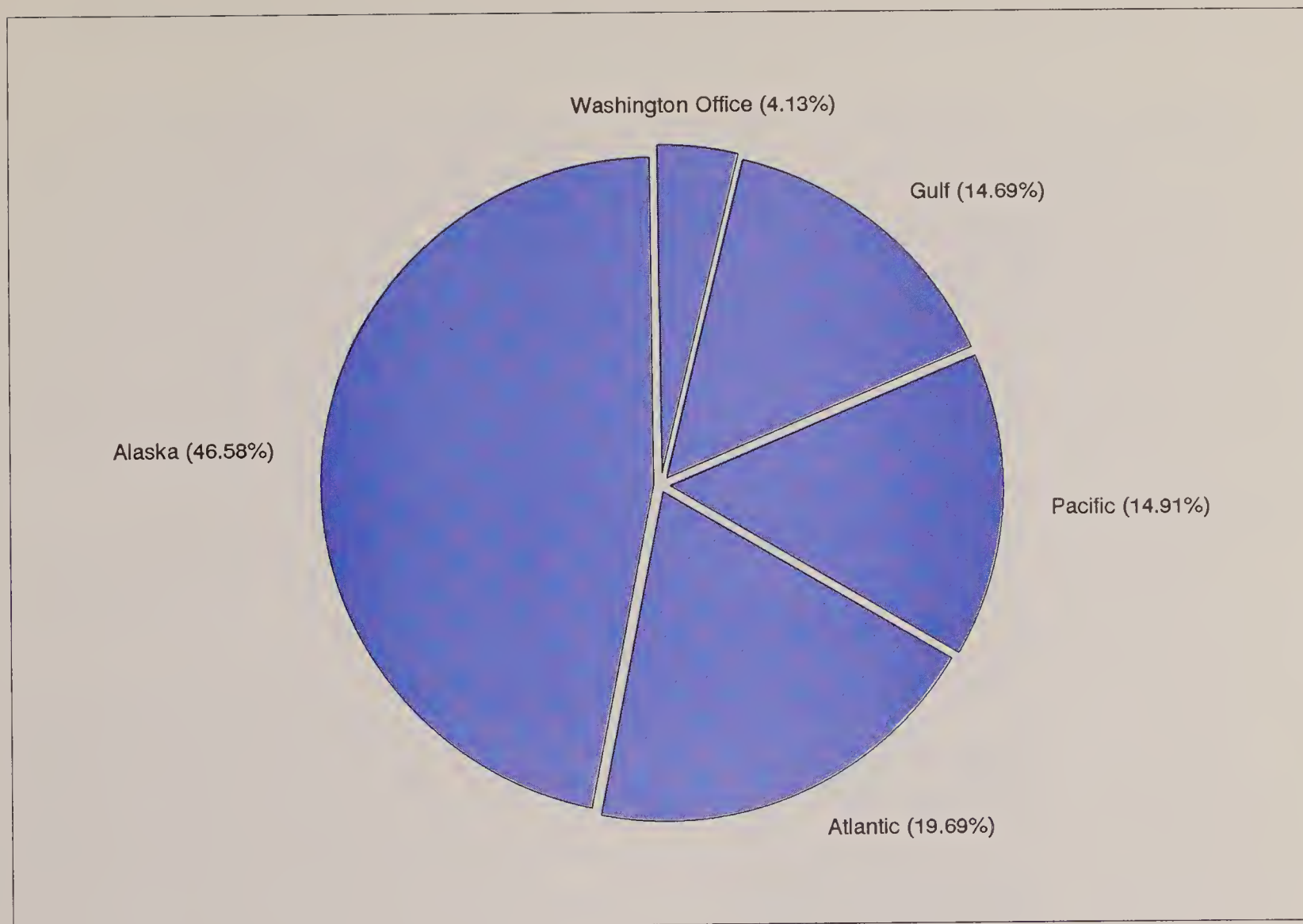


Figure 2-13. *Percentage of OCS Environmental Studies Program funds distributed by region, 1973 through September 1988.*

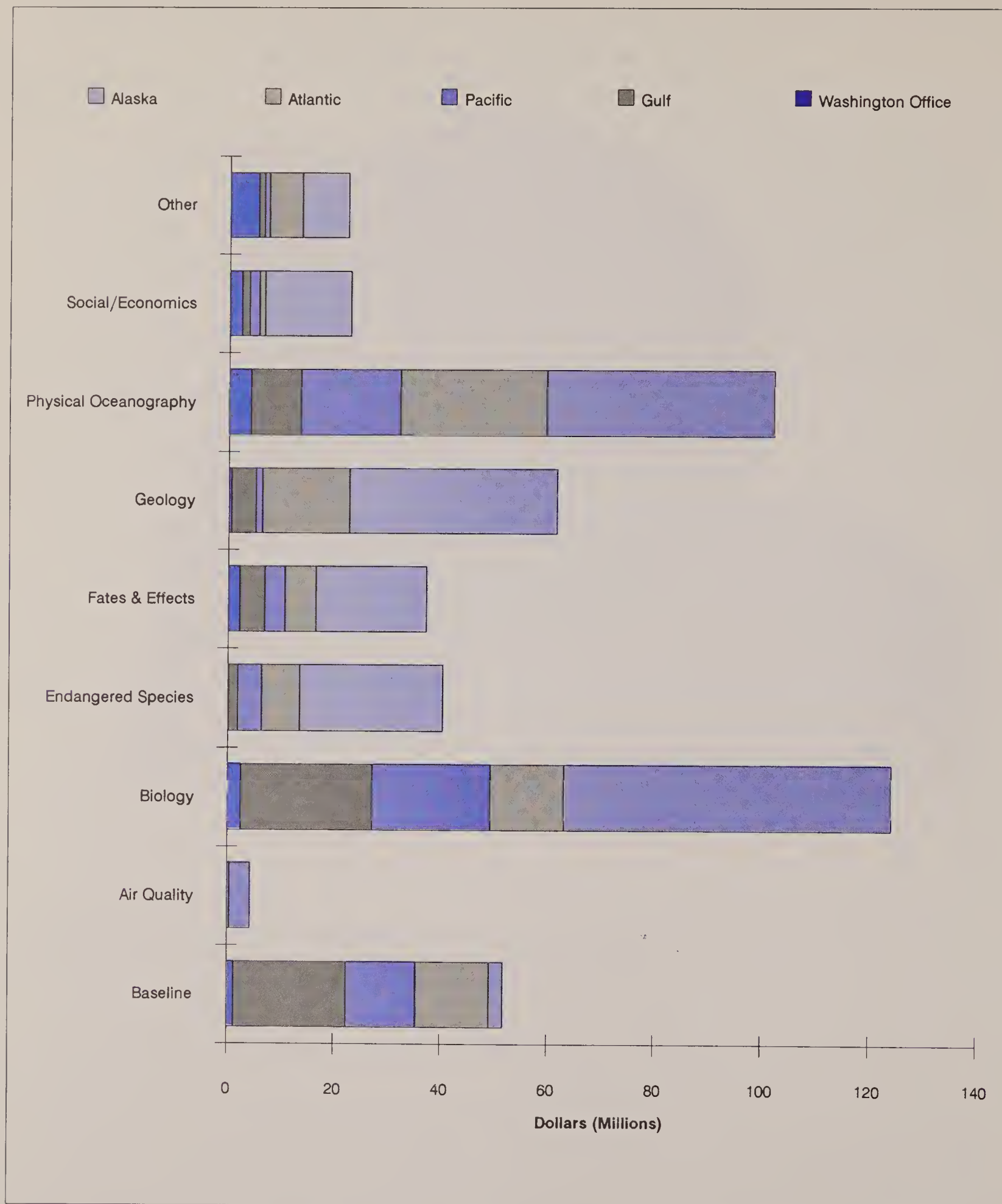


Figure 2-14. *Expenditures by discipline for the OCS Environmental Studies Program, 1973 through September 1988.*

3. Postlease Activities on the OCS

The MMS is responsible for regulating and monitoring operations on Federal leases and for collecting all revenues due the Government. Figure 3-1 on the next page depicts the steps involved in the postlease phase from lease issuance through the exploration, development, and production phases to the relinquishment of a lease. Recently, MMS consolidated all of the operational regulations related to the Offshore program into one document. (See "30 CFR Parts 250 and 256" sidebar for more information.)

Exploration Phase of Postlease Activities

Following the issuance of an OCS lease, the lessee or the designated operator may apply to the MMS for approval of a plan of lease exploration (EP). The EP may be for a single lease or multiple leases of the same lessee; it may also cross lease boundaries in cases where there is an approved unitization, pooling, or drilling agreement. The process that MMS employs in reviewing and approving or rejecting an applicant's EP is outlined in figure 3-2 (p. 63).

Exploratory drilling on the Federal OCS peaked at 597 wells drilled in 1984. This peak may be due, in part, to the decline in oil prices over the past several years. Figure 3-3 (p. 64) shows the number of exploratory wells drilled on the OCS from 1954 to 1988.

30 CFR Parts 250 and 256

On April 1, 1988, the final rule that consolidated into one document the existing multitier rules of the Offshore Program of the MMS was published in the *Federal Register* (53 FR 10596). This final rule governs all oil, gas, and sulphur exploration, development, and production operations in the OCS. The MMS laid out the following objectives in developing this rule:

- (1) To restructure and consolidate the past lease operating requirements placed upon OCS oil, gas, and sulphur lessees into a single document;
- (2) To establish performance standards in preference to detailed technical standards to the extent that protection of the environment and safety of operations permit;
- (3) To update safety and environmental requirements, recognize needs identified by technological advances, improve operating practices and experience;
- (4) To eliminate unnecessary reporting and recordkeeping requirements; and
- (5) To clarify and simplify the language of the rule and eliminate redundant and inappropriate provisions.

The current rule at 30 CFR 250 now contains the revised previous edition of 30 CFR 250, the Individual OCS Orders developed to govern operations conducted in each of the four MMS OCS Regions and portions of selected Notices to Lessees and Operators previously issued by MMS in each of the OCS Regions.

Further information on this consolidated rulemaking is available by writing or telephoning:

Branch of Rules, Orders, and Standards
Minerals Management Service, MS-646
381 Elden Street
Herndon, VA 22070-4817
(703) 787-1600

In a related effort, the MMS Office of Offshore Information and Publications recently made available its publication entitled, *Compilation of OCS Regulations Related to Mineral Resource Activity on the Outer Continental Shelf*. This loose-leaf publication compiles into one document most of the Federal regulations that affect development of the mineral resources of the OCS. For further information on, or for copies of, this publication, contact:

Documents Distribution Officer
Office of Offshore Information and Publications
Minerals Management Service, MS-642
381 Elden Street
Herndon, VA 22070-4817
(703) 787-1080

The OCS Information Program plans to publish a detailed information booklet entitled *OCS Leasing and Operations Procedures*.

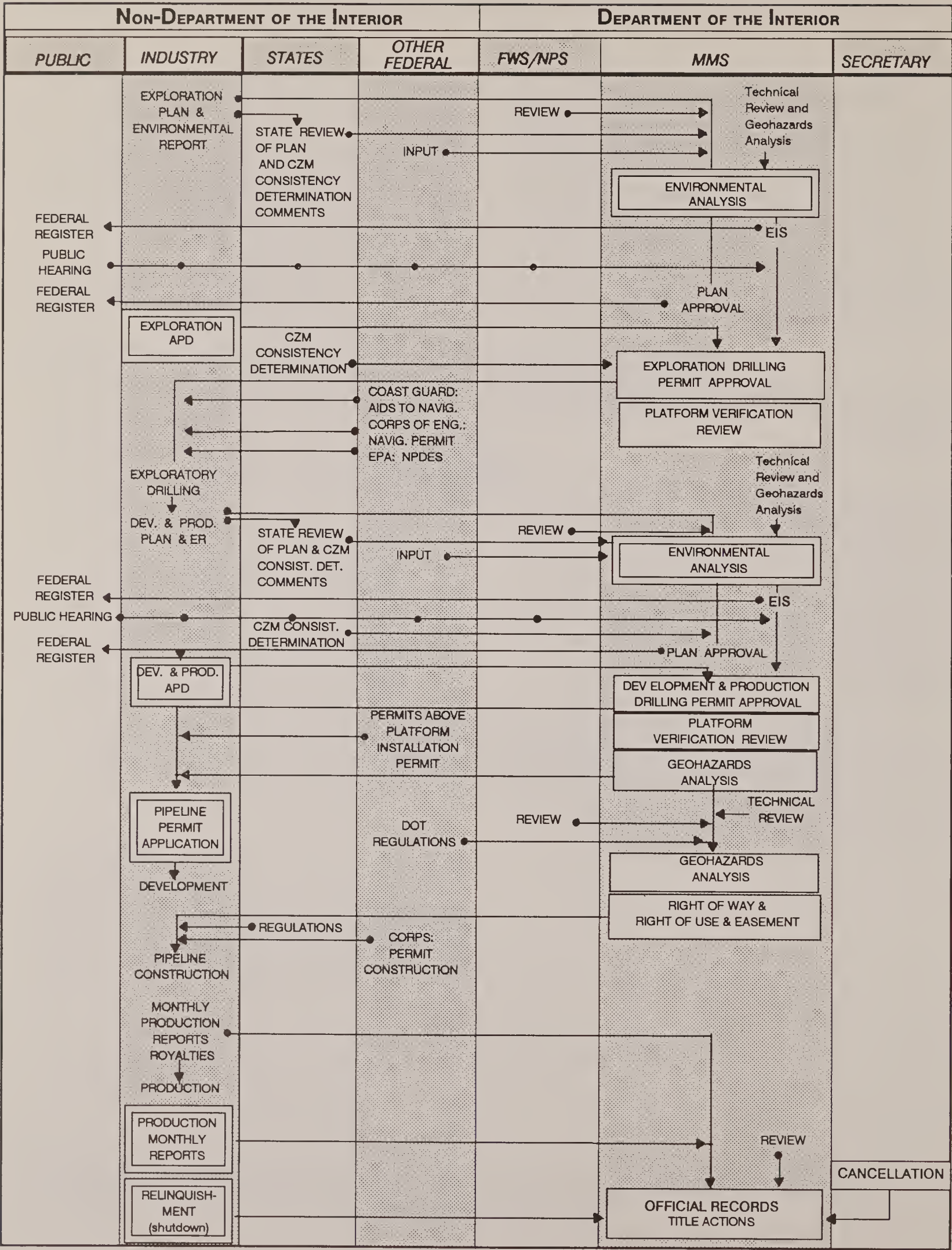


Figure 3-1. Postlease phase of the OCS oil and gas leasing process.

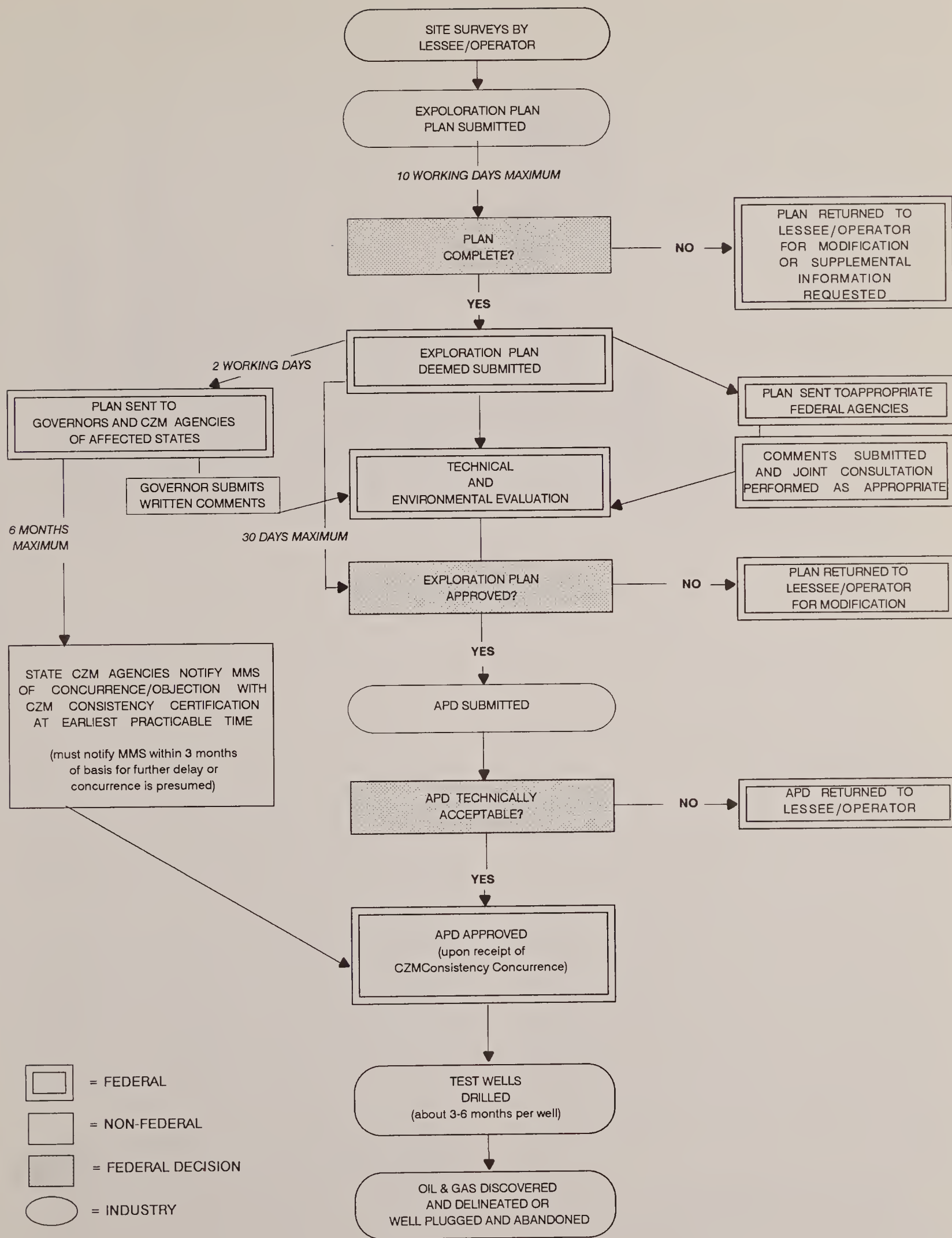


Figure 3-2. Exploration Plan review process.

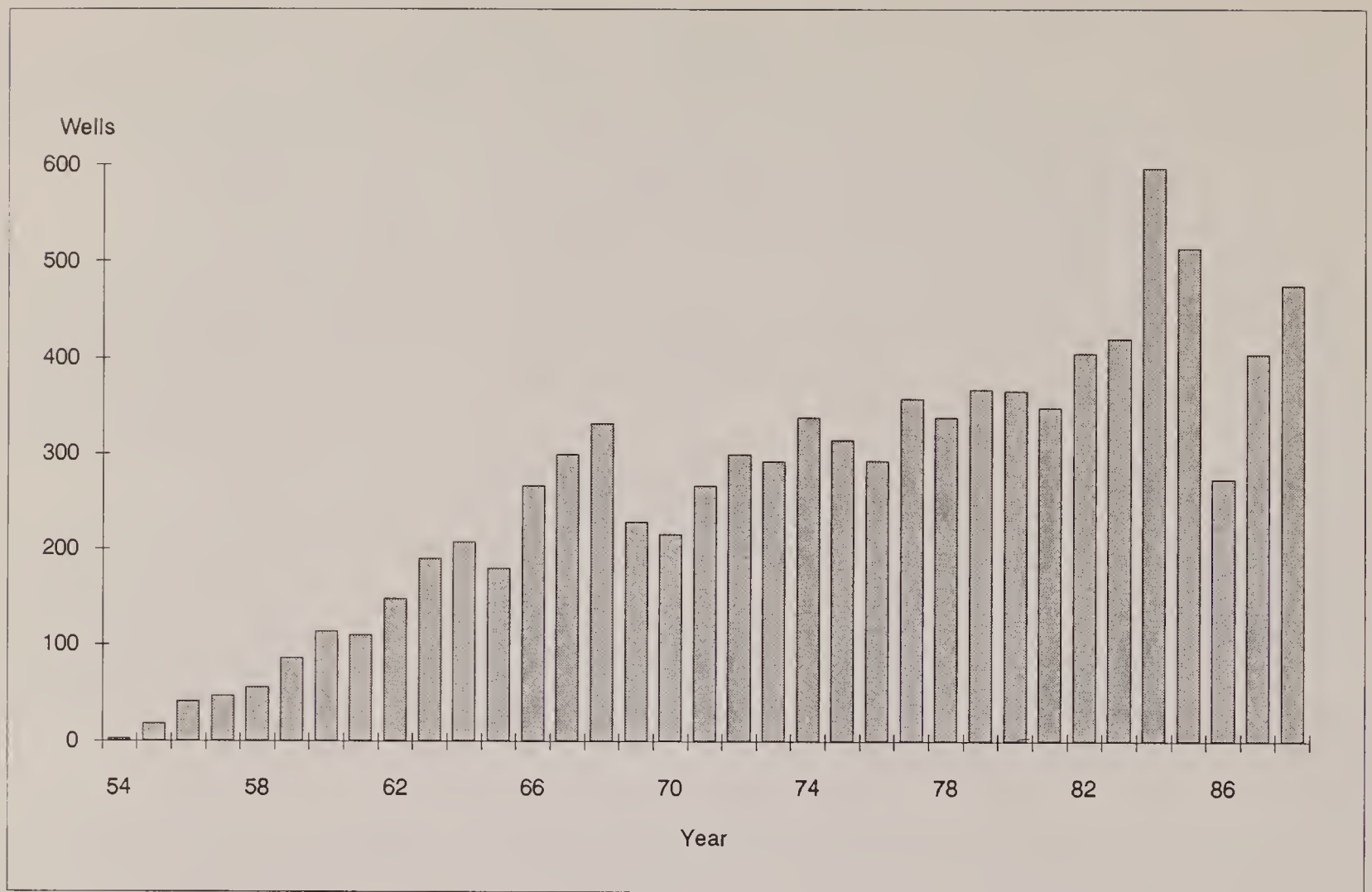


Figure 3-3. *Exploratory wells drilled on the OCS through September 1988.*

ALASKA OCS REGION

As of September 30, 1988, a total of 68 exploratory wells had been spudded in the Alaska OCS Region. Figure 3-4 on the next page graphically depicts the number of exploratory wells drilled by planning area and year on the Alaska OCS since the first well was spudded in September 1976. Table 3-1 (p. 66) lists the exploratory wells drilled in the Alaska OCS Region through September 1988. Figure 3-5 (p. 68) presents the location of each of the official protraction diagrams (OPD's) for the Alaska OCS Region. (See the sidebar for more information about OPD's.) Each of these OPD's may be ordered through the Alaska OCS Regional Office at the following address:

Alaska OCS Regional Library
Minerals Management Service
949 East 36th Avenue, Room 110
Anchorage, Alaska 99508-4302

Official Protraction Diagrams

The MMS uses two types of map projections to locate OCS leasing units or blocks. In nearshore areas of Texas, Louisiana, and a small part of California, extensions of onshore leasing grids are used. These grids are the Texas (Lambert) Plan Coordinate System, South and South-Central Zone; the Louisiana (Lambert) Plane Coordinate System, South Zone; and the California (Lambert) Plane Coordinate System, Zone 6. Off southern California in the areas of the Channel Islands, MMS uses OCS Leasing Maps 6A, 6B, 6C, 6D, and 6E. Blocks in these maps are designated by north and west coordinates. Whole blocks in OCS leasing maps contain 5,760 acres.

The remainder of the OCS is mapped on official protraction diagrams (OPD) using the Universal Transverse Mercator (UTM) System. Each OPD covers an area of 1 degree latitude by 2 degrees longitude and is divided into blocks. Whole blocks in OPD's contain 2,304 hectares (approximately 5,693 acres). Each leasing map or OPD bears a unique alphanumeric designator and, in most cases, the name of a nearby city, town, or prominent natural feature.

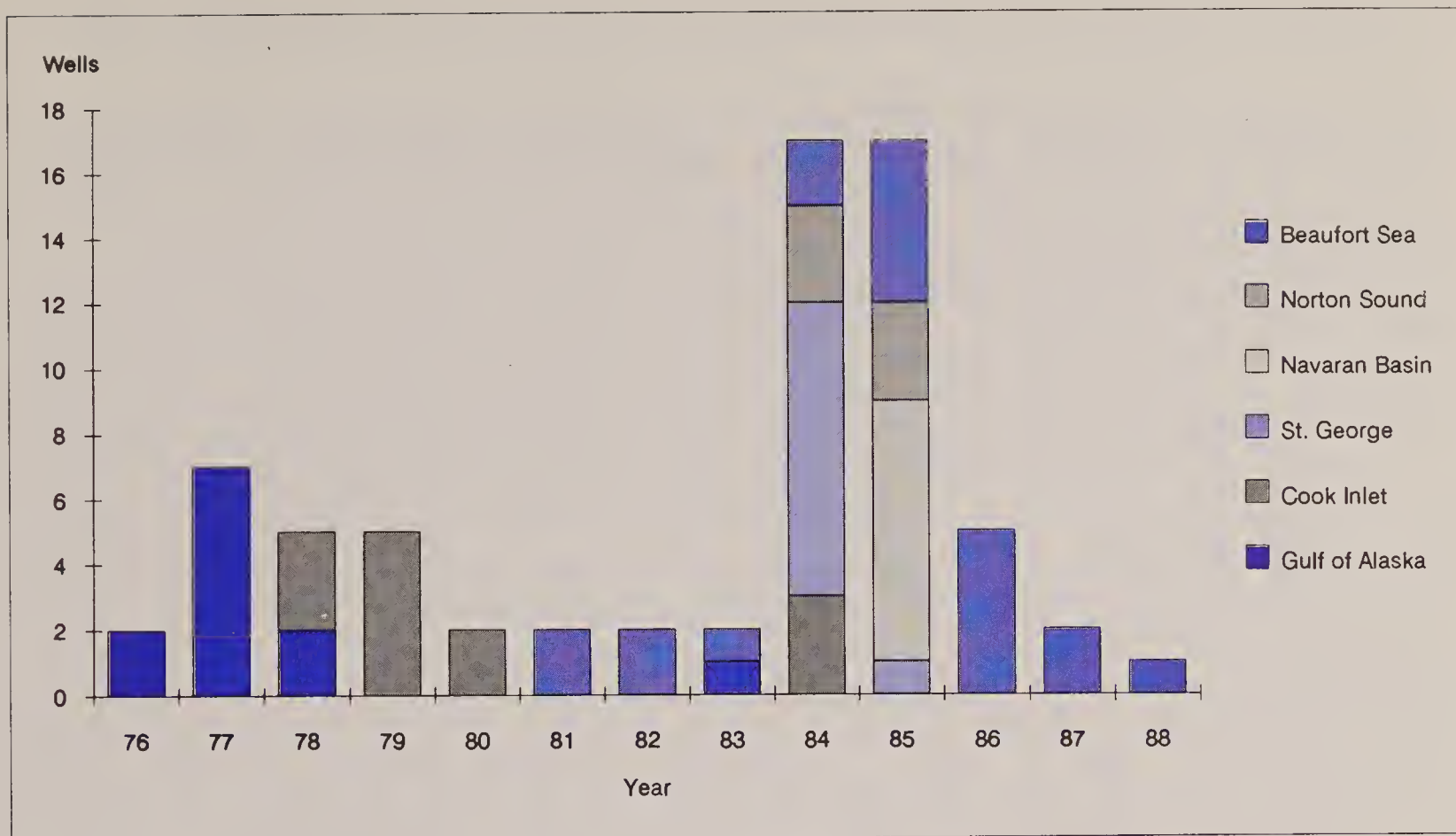


Figure 3-4. *Exploratory wells drilled in the Alaska OCS Region by planning area through September 1988.*

Shell Oil Company was the first to begin exploratory drilling on the Alaska OCS. Initial interest was focused in the northern Gulf of Alaska. Ten exploratory wells were drilled by five operators between 1976 and 1978, with the greatest exploratory activity occurring in the spring and summer of 1977. All of the wells were determined to be dry and were plugged and abandoned.

In 1978, interest on the Alaska OCS shifted to the lower Cook Inlet where 10 exploratory wells were drilled between 1978 and 1980. Industry's interest in this area was high because production was occurring in nearby State waters in the upper Cook Inlet. Marathon Oil Corporation was the first to begin exploratory drilling on the lower Cook Inlet. The first well was spudded in July 1978 and had a show of oil in noncommercial volumes. The well was plugged and abandoned on December 22, 1978. Marathon drilled a second well in 1979. It was determined to be dry and was also plugged and abandoned.

Two companies other than Marathon were also active in the lower Cook Inlet. Phillips Petroleum Exploration drilled an exploratory well in three different

blocks in 1978 and 1979; all three wells were dry. Atlantic Richfield Company also drilled three wells on the lower Cook Inlet. The first well, spudded in 1979, was dry. The second well had a show of oil that was not commercially significant, and the well was plugged and abandoned. The third well was dry and was plugged and abandoned in June 1980.

With the issuance of leases from the Joint Federal-State Beaufort Sea Lease Sale in December 1979, industry began to explore in the Beaufort Sea. Exxon was the first to explore in the Beaufort Sea, drilling two wells from a gravel island. The gravel island was constructed during the 1981-82 drilling season and is 480 feet in diameter and 11 feet above mean high water. The first well was spudded on November 1, 1981, and was temporarily plugged and abandoned on March 31, 1982. The second well was spudded on December 27, 1981; it was temporarily plugged and abandoned on March 7, 1982. This well has been determined to be producible by MMS. (See Determination of Well Producibility sidebar, p. 69, for more information.)

Table 3-1. Exploratory wells drilled in the Alaska OCS Region through September 1988

Sale	Prospect/ unit name	OPD number	Block	Lease number	Operator	Well number (ft)	Water depth	Spud date	P&A date	Total depth (ft)
GULF OF ALASKA										
39	Maria		106	0011	Shell	1	541	09-01-76	01-28-77	13,565
39	Salome		72	0007	Arco	1	250	10-21-76	06-03-77	17,920
39	Yvonne		111	0014	Shell	1	485	02-11-77	06-19-77	13,598
39						1 ST	485	06-20-77	09-12-77	15,390
39	Setter		284	0050	Exxon	1	585	03-08-77	07-08-77	12,995
39	Cape Suckling		241	0046	Texaco	1	599	04-15-77	07-15-77	15,013
39	Walrus		329	0059	Gulf	1	623	05-13-77	08-16-77	12,170
39	Raccoon NO 6-2		343	0080	Exxon	1	448	07-09-77	01-04-78	13,507
39	Yakataga NO 7-1		162	0032	Texaco	1	234	07-17-77	02-20-78	15,638
39	Marmot NO 7-1		414	0072	Exxon	1	863	01-09-78	03-17-78	9,835"
39	Grizzly		165	0035	Exxon	1	184	03-23-78	07-01-78	11,731
55	Yakutat NO 7-2		932	0211	Arco	1	450	04-10-83	10-22-83	17,810
COOK INLET										
CI	Guppy		318	0086	Marathon	1	120	07-21-78	12-22-78	13,315
CI	South Arch		668	0124	Phillips	1	267	10-09-78	10-19-78	1,254
CI						1A	267	10-20-78	05-18-79	11,294
CI	Coho	NO 5-4	2	0168	Marathon	1	542	01-11-79	04-27-79	2,797
CI						2	542	04-29-79	08-21-79	8,907
CI	Bede	NO 5-2	798	0136	Phillips	1	245	05-28-79	09-18-79	10,324
CI	Hawk	NO 5-1	572	0161	Arco	1	133	07-15-79	01-21-80	14,975
CI	Bowhead	NO 5-2	970	0152	Phillips	1	513	09-24-79	04-26-80	13,128
CI	Raven		401	0097	Arco	1	192	04-06-80	05-29-80	7,491
CI	Ibis		576	0113	Arco	1	202	05-09-80	06-24-80	7,016
60	Falcon		225	0243	Chevron	1	115	09-19-84	11-12-84	5,574
60	Cardinal	NO 5-3	654	0248	Chevron	1	550	11-21-84	12-18-84	1,890
60						1A	550	12-18-84	03-13-85	10,130
ST. GEORGE										
70	Tustemena	NO 3-7	809	0530	Exxon	1	420	06-29-84	09-04-84	8,800
70	Intrepid		714	0519	Chevron	1	437	07-20-84	09-25-84	11,587
70	Rat		889	0537	Arco	1	436	08-04-84	10-30-84	12,456
70	Columbia		764	0527	Exxon	1	421	09-13-84	11-19-84	12,433
70	Bertha	NO 3-1	616	0466	Mobil	1	358	09-29-84	11-03-84	8,085
70	Wolf Lake	NO 3-7	631	0511	Arco	1	390	11-07-84	12-14-84	10,862
70						1A	390	12-17-84	02-14-85	13,937
70	Fern	NN 3-1	467	0454	Shell	1	420	11-20-84	01-24-85	10,277
70	Camelot		811	0477	Gulf	1	476	11-27-84	01-23-85	9,592
70	Monkshood		604	0463	Shell	1	394	01-26-85	03-31-85	8,510
NORTON SOUND										
57	Chugach		267	0414	Exxon	1	054	06-19-84	07-23-84	3,636
57	Birch	NQ 3-7	949	0436	Arco	1	065	06-25-84	08-19-84	10,950
57	Teton	NP 3-2	448	0430	Exxon	1	035	07-25-84	08-16-84	4,951
57	Cascade		54	0398	Exxon	1	058	07-02-85	07-23-85	6,913
57	Yellow Pup		182	0407	Exxon	1	058	07-24-85	08-11-85	7,867
57	Chugach	NP 3-2	361	0425	Exxon	1	042	08-13-85	08-24-85	6,093
BEAUFORT SEA										
BF	Beechy Pt	.NR 6-3	654	0191	Exxon	1	018	11-01-81	03-31-82	11,638
BF						2*	018	12-27-81	03-15-82	13,441
BF	Tern		744	0195	Shell	1*	021	05-28-82	09-18-82 T	13,176
BF	Tern		745	0196	Shell	1*	021	10-16-82	03-03-83 T	13,399
BF	Seal		516	0181	Shell	1*	039	02-04-84	06-30-84 T	13,078
71	Mukluk	NR 5-4	280	0334	Sohio	1	048	11-01-83	01-24-83	9,860
71	Antares	NR 5-2	971	0280	Exxon	1	049	11-01-84	01-18-85	8,450
71						2	049	01-19-85	04-12-85	11,608
BF	Seal	NR 6-3	472	0180	Shell	1	039	02-22-85	07-21-85 T	16,090
87	Hammerhead	NR 6-4	624	0849	Unocal	1*	104	08-10-85	09-24-85	8,034
87						2	107	09-26-86	10-11-86	6,460

Table 3-1. Exploratory wells drilled in the Alaska OCS Region through September 1988--cont.

Sale	Prospect/ unit name	OPD number	Block	Lease number	Operator	Well number (ft)	Water depth	Spud date	P&A date	Total depth (ft)
71	Harvard	NR 6-3	424	0370	Shell	1*	049	09-02-85	09-07-88	12,575
71			425	0371	Amoco	2*	049	02-08-86	09-07-88	14,988
87	Orion	NR 5-4	8	0804	Exxon	1	050	11-10-85	12-15-85	7,300
71	Mars		140	0302	Amoco	1	025	03-12-86	04-27-86	7,982
87	Corona	NR 6-4	678	0871	Shell W.	1	116	07-28-86	09-18-86	10,000
71	Phoenix	NR 5-4	284	0338	Tenneco	1	061	09-23-86	12-19-86	9,866
BF	Tern	NR 6-3	789	0197	Shell	1*	021	02-10-87	05-10-87 T	14,650
87	Aurora	NR 7-3	890	0943	Tenneco	1	068	11-02-87	08-30-88	
87	Belcher	NR 7-3	724	0917	Amoco	1	167	09-05-88		
NAVARIN BASIN										
83	Nicole	NO 1-2	414	0707	Amoco	1	443	06-07-85	08-27-85	11,030
83	Redwood	NP 1-7	693	0599	Exxon	1	483	06-14-85	08-30-85	11,536
83	Danielle	NP 1-8	227	0639	Amoco	1	393	06-19-85	08-20-85	10,045
83	Packard	NP 1-7	637	0586	Arco	1	541	08-05-85	10-23-85	13,741
83	George		157	0560	Amoco	1	480	08-22-85	10-08-85	9,085
83	Redwood		606	0583	Exxon	1	481	08-31-85	10-12-85	11,570
83	Misha	NO 1-1	197	0673	Amoco	1	473	08-31-85	10-21-85	7,962
83	Nancy	NO 1-2	723	0719	Amoco	1	450	10-12-85	11-25-85	8,708

(T) Temporarily abandoned

* Determined "Producible" by MMS in accordance with 30 CFR 250.11.

NOTE: As used herein the P & A date is defined as the date the casing is cut and removed from the seafloor.

"P & A Date" and the "Total Depth" data are derived from the MMS Well Completion or Recompletion Report and Log Form MMS 330.

SOURCES: Frontier OCS Exploratory Drilling Report (11-09-87)
Selected OCS Statistics (06-24-88)

Shell Western Exploration and Production, Inc. (SWEPI) was the next operator to explore the Beaufort Sea, submitting a plan of exploration on September 25, 1981. The project, known as the Shell Tern Prospect, received exploration plan approval on October 23, 1982. A gravel island was constructed, and two wells were drilled during the summer and fall of 1982. Both of these wells have been determined producible by MMS and have been temporarily plugged and abandoned.

In 1983, two additional operators, Arco Oil and Gas Company and Sohio, began exploration in the Alaska OCS in search of oil and gas. Arco drilled a well in the Gulf of Alaska. This well, which was the last well drilled in the Gulf of Alaska, did not produce a commercial find and was plugged and abandoned in October 1983.

On November 1, 1983, a Sohio-led consortium spudded the most expensive wildcat well in history. The Mukluk Prospect was drilled from the largest manmade gravel island in U.S. waters at a site further north (approximately 300 m (984 ft) above the Arctic

Circle) in deeper water (48 ft) than ever previously attempted. Results of the drilling showed no commercially producible hydrocarbons.

Exploratory drilling on the Alaska OCS peaked in 1984 and 1985 as the price of crude oil reached its peak (refer to fig. 3-4, p.65). Exploration expanded to include 5 of the 15 Alaska OCS planning areas, with a total of 17 wells being drilled by 7 offshore operators (Amoco, Arco, Chevron, Exxon, Gulf, Mobil, and Shell). The following is a breakdown of the number of wells drilled in each of the five Alaska OCS planning areas from 1984 to 1985.

- In the St. George Basin, 10 wells were drilled by 6 operators. This area was the most active area off the coast of Alaska in 1984. All 10 wells were dry. The last well was plugged and abandoned on March 31, 1985.
- In the Cook Inlet, three wells were drilled by Chevron in 1984. All three were dry and were plugged and abandoned.

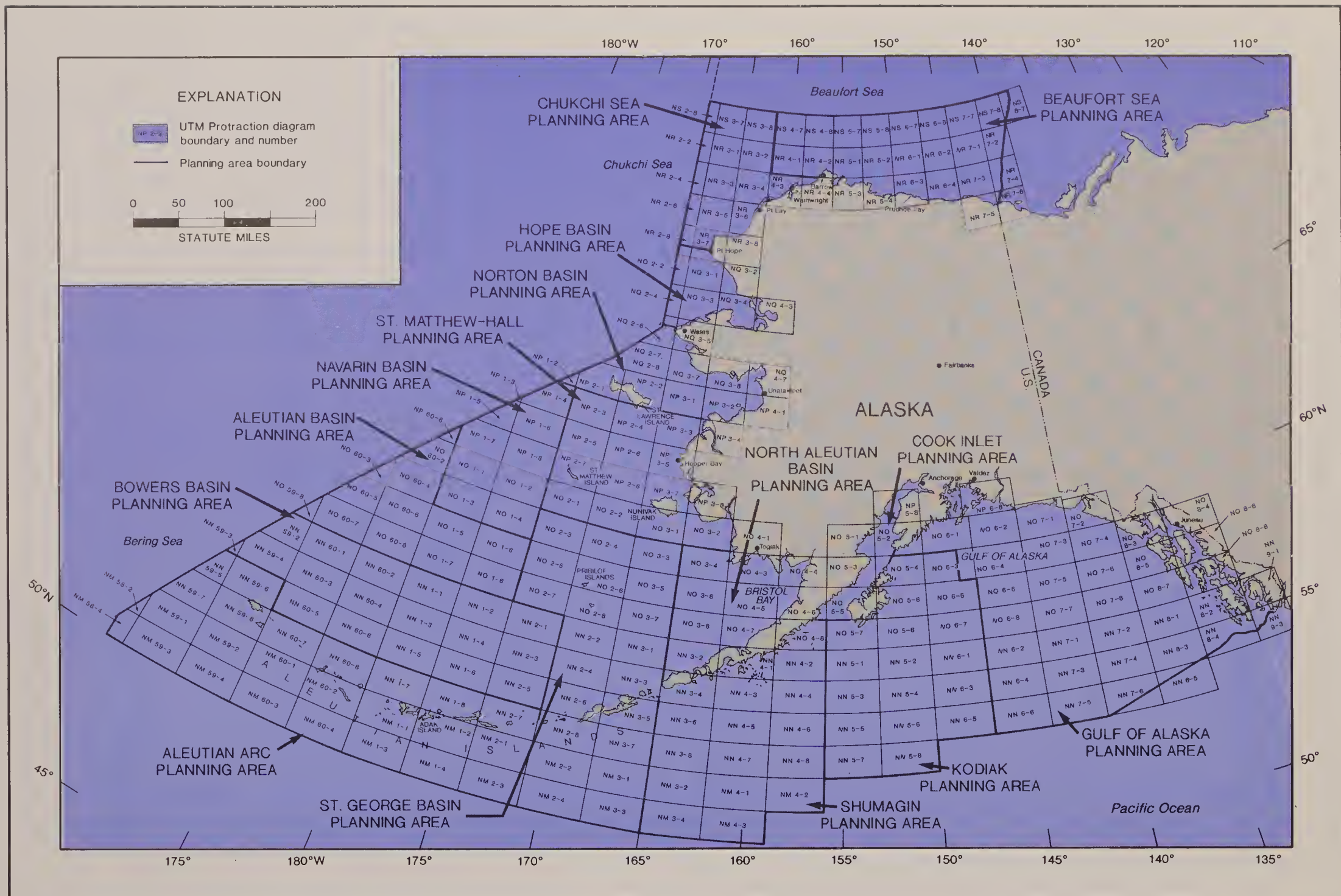


Figure 3-5. Alaska OCS Region official protraction diagrams.

- In the Norton Sound, a total of six wells were drilled by two operators. Arco drilled one well in 1984, and Exxon drilled five wells, two in 1984 and three in 1985. All six wells were dry and were plugged and abandoned.
- In the Navarin Basin, a total of eight exploratory wells were drilled by Arco, Amoco, and Exxon. This area was the most active area off the coast of Alaska in 1985. All eight wells were dry and were plugged and abandoned.
- In the Beaufort Sea, a total of seven wells were drilled by Exxon, Shell, and Unocal. Three of these wells were determined producible by MMS, and two were temporarily abandoned. The other four wells were dry and were plugged and abandoned.

The Beaufort Sea Planning Area in 1984 and 1985 was the scene for many innovative exploration projects. The industry employed technologies from the Canadian Arctic as operators moved away from their early reliance on gravel island drilling platforms.

Exxon initiated drilling on the Antares Prospect on November 1, 1984, using the *Glomar Beaufort Sea I*, the Concrete Island Drilling System (CIDS). The structure and design of CIDS were discussed extensively in the *Arctic Summary Report, January 1985* (Lynch, Slitor, and Rudolph, OCS Information Report MMS 85-0022). The first well recovered non-commercial traces of oil and was plugged and abandoned. The second well, spudded in January 1985, also showed no commercial reserves of hydrocarbons; it was plugged and abandoned on April 13, 1985. On November 10, 1985, a third well was spudded from CIDS as Exxon initiated exploratory drilling of its Orion Prospect, a few miles off Point Halkett in the Beaufort Sea. This well was plugged and abandoned on December 15, 1985.

The most noteworthy facet of Exxon's work on the Antares project was the successful use of the CIDS mobile drilling structure. The Antares well was the first well drilled in the Alaskan Beaufort OCS from a platform other than a gravel island.

SWEPI initiated exploratory drilling on their Harvard Prospect on September 2, 1985. This well was drilled from the Sandpiper gravel island approximately 6 miles from shore. This well was temporarily abandoned on January 25, 1986, and has been determined producible by MMS.

Determination of Well Producibility

Effective May 31, 1988, the MMS changed its procedures for determining well producibility. Prior to that time an OCS operator was required to submit to MMS a well producibility determination for each exploratory well that it drilled. This requirement was articulated under what was known as OCS Order Number 4. This OCS Order, and all others, were incorporated into the MMS regulatory program effective May 31, 1988. OCS Order Number 4 became 30 CFR 250.11, "Determination of Well Producibility."

Under this new regulation, an operator is no longer required to submit an evaluation of every exploratory well drilled. However, in accordance with the terms of 30 CFR 250.11, an operator, requesting an extension of lease term, may request that a determination of well producibility be made for any well that the operator drills. Upon receiving a written request from the lessee, the MMS will determine whether a well is capable of producing in paying quantities (production of oil, gas, or both in quantities sufficient to yield a return in excess of the costs, after completion of the well, of producing the hydrocarbons at the wellhead). Such a determination shall be based upon a number of tests outlined within the new regulation.

These determinations are the bases of MMS's decision to extend a lease's term and are not intended to imply that a well has been determined to be commercial. The operator of the well makes the determination whether the well is commercial or noncommercial.

SWEPI had also drilled two other wells in 1984 and 1985 from Seal Island. The first well was spudded on February 4, 1984, and was temporarily abandoned; it has been determined producible by MMS. The second well was plugged and abandoned on July 21, 1985.

Exploration drilling on the Hammerhead Prospect began on August 10, 1985, by Unocal, using the *Canmar Explorer II*. The Canmar drillship is a converted U.S. Navy storm class Cimari cargo ship with a steel-reinforced hull for work in waters pervaded with sea ice. This well has been determined producible by MMS; it was permanently abandoned on September 24, 1985.

Since 1985, exploratory activities on the Alaska OCS have focused on the Beaufort Sea. Work progressed on the Harvard, Mars, Corona, Hammerhead, and Phoenix Prospects with a total of five wells drilled in 1986 and on the Tern and Aurora Prospects with one well drilled in 1987 and one in 1988. Two of the seven wells drilled were determined producible by MMS. A total of eight wells on the Beaufort Sea OCS have been determined producible.

Two operators have announced discoveries resulting from their exploratory efforts on the OCS of the U.S. Beaufort Sea. Shell has announced that it has drilled discovery wells from both Seal and Sandpiper Islands. Shell has indicated that its Seal Island discovery appears to be commercial. Unocal has announced that both of its Hammerhead exploratory wells, located on the OCS offshore Flaxman Island, were successful. To date, UNOCAL has not indicated whether the Hammerhead discovery is commercial. Neither company has begun the permitting phase of development and production activities.

Amoco has received approval for its exploration plan covering the Belcher Prospect. The plan covers blocks OCS-Y 917, 918, and 926. Amoco spudded the first of its wells on lease 917 of the Belcher Prospect on September 5, 1988. The semisubmersible drill rig *Kulluk* is being used to drill this well.

ATLANTIC OCS REGION

Since the first well was spudded in April 1978, 46 exploratory wells have been drilled in the Atlantic OCS Region. Industry interest in this region has focused on an ancient buried reef trend, which is believed to extend intermittently from Massachusetts to Florida. Figure 3-6 on the next page displays the number of wells drilled in the Atlantic OCS Region, by planning area and year. As the chart indicates, 70 percent of the wells were drilled in the Mid-Atlantic Planning Area, with over 68 percent drilled in 1978 and 1979 alone. The last Atlantic exploratory well was plugged and abandoned in November 1984. Table 3-2 (p.72) lists the exploratory wells drilled in the Atlantic OCS Region by planning area and lease sale. Figure 3-7 (p. 73) presents the location of each of the official protraction diagrams for the Atlantic OCS Region. Each of these OPD's may be ordered from the Atlantic OCS Regional Office at the following address:

Atlantic OCS Region
Minerals Management Service
381 Elden Street
Herndon, VA 22070-4817

Eight exploratory wells were drilled by five offshore operators within the Georges Bank Basin in the North Atlantic Planning Area between July 1981 and September 1982. The drilling sites ranged from 110 to 150 miles southeast of the Nantucket Island, off the coast of Massachusetts. All eight wells were dry and were plugged and abandoned.

Exploratory drilling in the Mid-Atlantic Planning Area began on March 29, 1978, when Exxon drilled the first Atlantic OCS exploratory well in the Baltimore Canyon Trough. Since then, 32 exploratory wells have been drilled by 9 offshore operators. Five wells, drilled on a single large structure (the Texaco-Tenneco Block 598-642 Unit), produced test flows of hydrocarbons, although none indicated the existence of commercial quantities. All 32 wells have been plugged and abandoned.

Since 1979, six exploratory wells have been drilled by four offshore operators in the South Atlantic Planning Area. All of these wells were located in the Southeast Georgia Embayment. There were no commercial hydrocarbon discoveries, and the last well was plugged and abandoned on February 12, 1980.

No exploratory wells have been drilled on the Atlantic OCS since 1984. However, on October 25, 1988, Mobil Exploration & Producing U.S. Inc. announced its intention to file an Exploration Plan early in 1989 for drilling on the Manteo Prospect, which is 47 miles (75.4 km) off Cape Hatteras, N.C. early in 1989. The actual drilling date is anticipated to be in the spring or early summer of 1990.

[Replaces Figure 3-6 on Page 71]

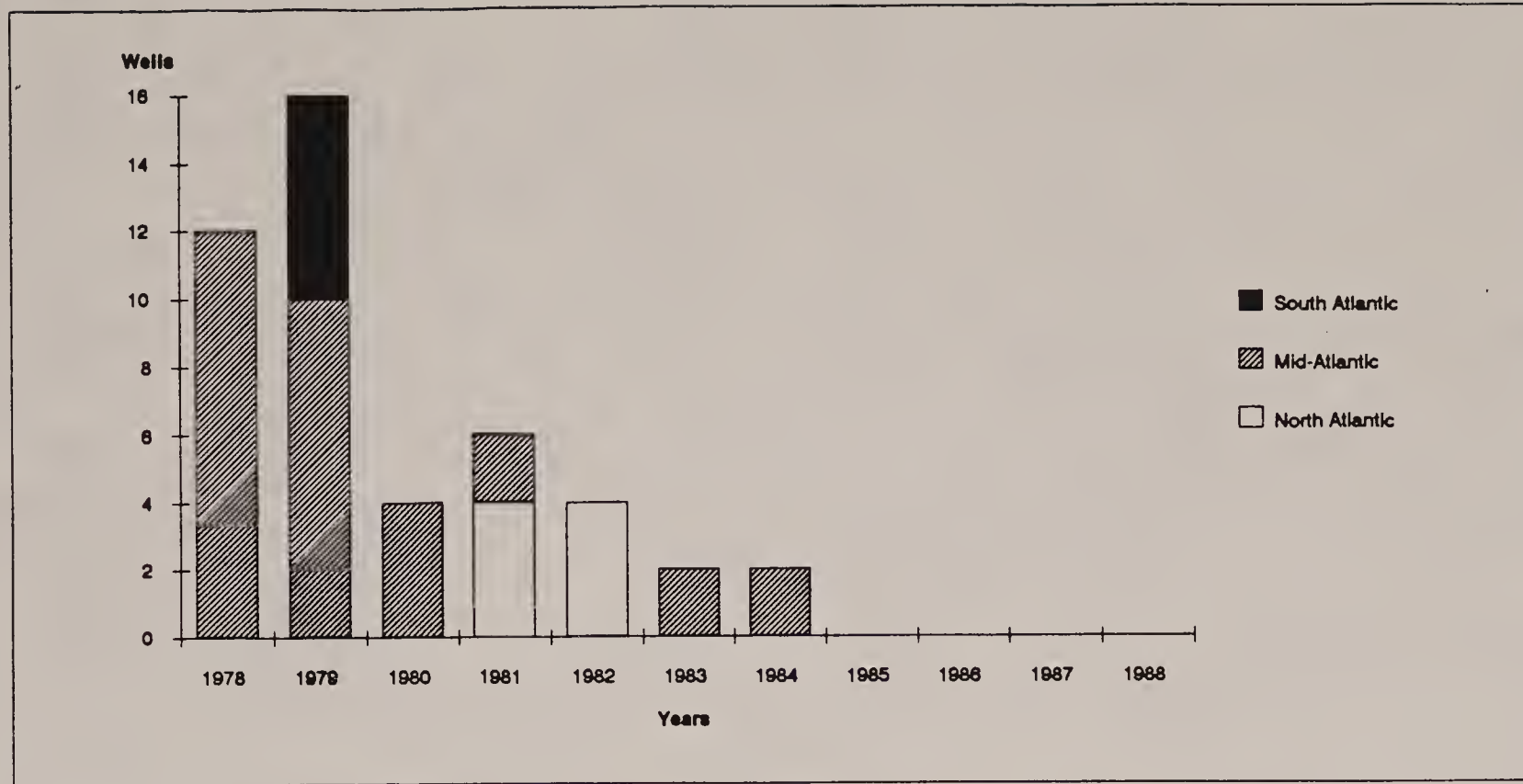
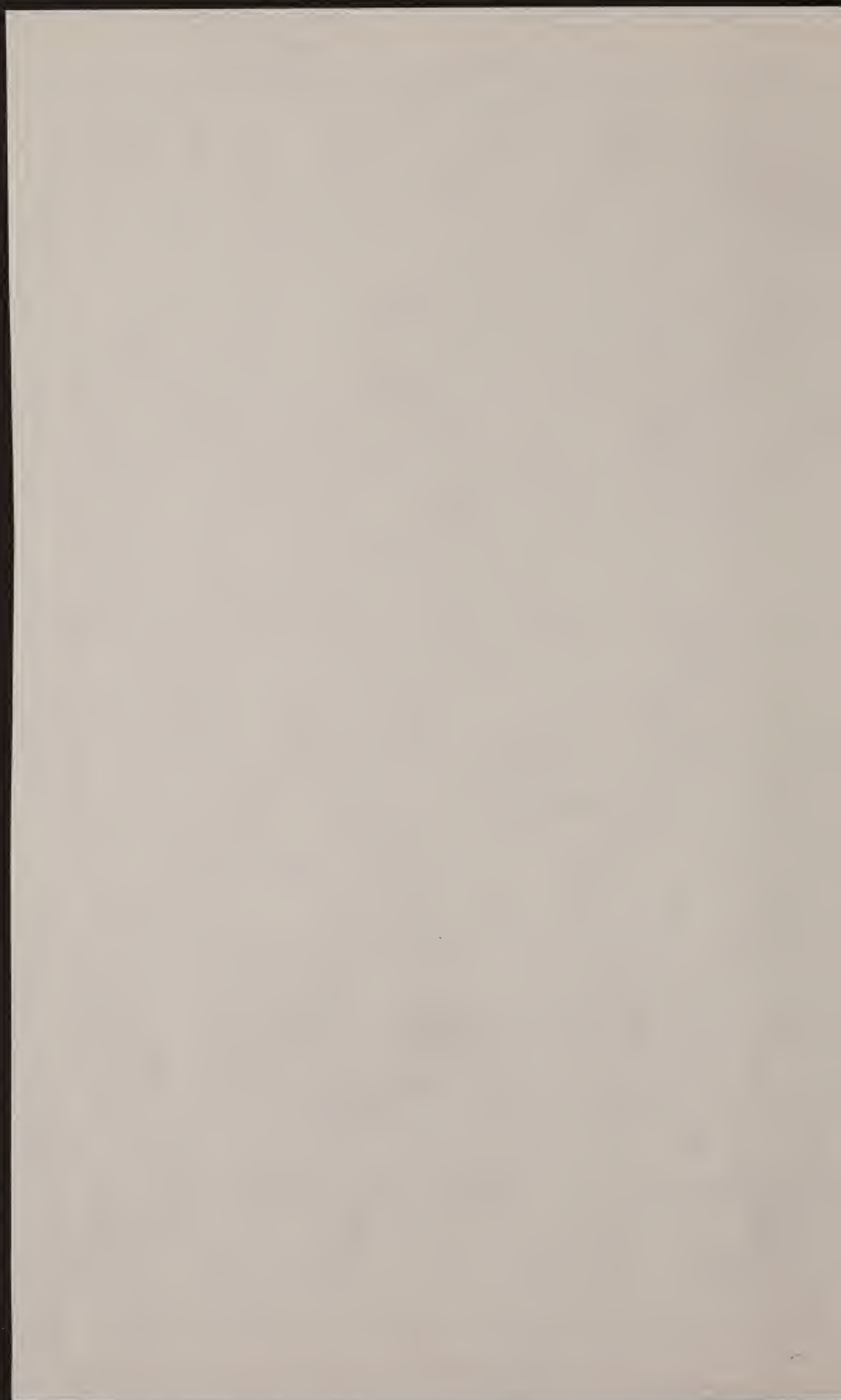


Figure 3-6. *Exploratory wells drilled in the Atlantic OCS Region by planning area through September 1988.*



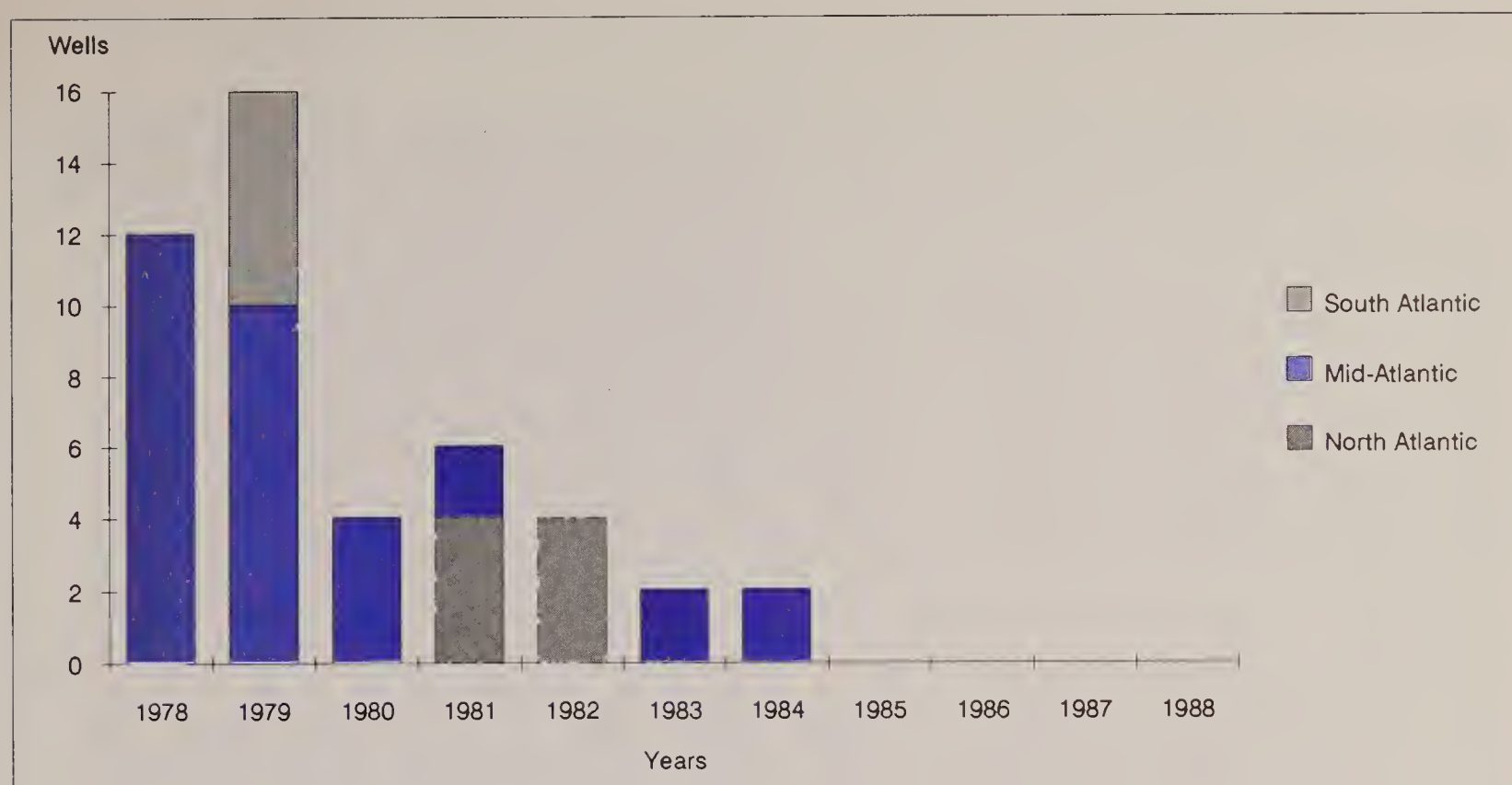


Figure 3-6. *Exploratory wells drilled in the Atlantic OCS Region by planning area through September 1988.*

Table 3-2. Exploratory wells drilled in the Atlantic OCS Region through September 1988

Lease number	Block number	OPD number	Status (1)	Operator	POE approval date	Well number	APD date	Spud date	Completion date	Depth drilled (ft)	Well report number
NORTH ATLANTIC											
NA	141	NK 19-1	NA	Ocean Prod.	NA	G-2	12/23/76	01/06/77	08/06/77	21,872	OCS-0004
NA	79	NK 19-1	NA	Ocean Prod.	10/16/75	G-1	03/10/76	04/06/76	07/27/76	16,071	OCS-0003
170	133	NK 19-1	R	Exxon	01/15/81	133-1	01/12/81	07/24/81	11/24/81	14,118	
218	410	NK 19-1	R	Shell	03/11/81	410-1	05/10/81	07/24/81	03/31/82	15,568	
153	975	NK 19-9	R	Exxon	08/12/81	975-1	09/02/81	11/25/81	03/10/82	14,605	
200	312	NK 19-1	R	Mobil	02/06/81	312-1	10/27/81	12/08/81	06/27/82	20,000	
182	187	NK 19-1	R	Tenneco	06/19/81	187-1	06/08/81	03/12/82	08/21/82	18,127	
210	357	NK 19-1	R	Shell	08/26/81	357-1	11/27/81	04/14/82	09/27/82	19,427	
179	145	NK 19-1	R	Conoco	11/27/81	145-1	04/05/82	05/17/82	08/25/82	14,500	
196	273	NK 19-1	E	Mobil	06/11/81	273-1	03/26/82	06/30/82	09/13/82	15,580	
MID-ATLANTIC											
NA	594	NJ 18-3	NA	Ocean Prod.	NA	B-2	12/14/75	12/14/75	03/28/76	16,043	OCS-0001
46	684	NJ 18-3	R	Exxon	06/01/79	684-1	01/24/77	03/29/78	12/23/78	17,620	
28	598	NJ 18-3	R	Texaco	11/09/77	598-1	05/19/77	04/16/78	08/26/78	15,025	
24	590	NJ 18-3	R	Conoco	12/21/77	590-1	09/27/77	04/17/78	06/07/78	12,000	
32	632	NJ 18-3	R	Shell	12/21/77	632-1	09/22/77	04/24/78	07/14/78	14,000	
42	676	NJ 18-3	R	Houston Oil	12/21/78	676-1	12/06/78	06/02/78	09/22/78	12,500	
59	857	NJ 18-3	E	Gulf	11/09/77	857-1	07/26/77	06/10/78	01/29/79	18,554	
15	544	NJ 18-3	E	Mobil	11/09/77	544-1	02/15/77	06/23/78	12/29/78	17,449	
97	273	NJ 18-6	R	Shell	11/09/77	273-1	05/18/77	07/15/78	12/16/78	17,500	
28	598	NJ 18-3	R	Texaco	11/09/77	598-2	08/28/78	09/03/78	03/20/79	17,708	
57	855	NJ 18-3	R	Houston Oil	09/08/78	855-1	04/24/78	09/24/78	02/08/79	17,505	
65	902	NJ 18-3	R	Exxon	04/20/78	902-1	12/27/77	11/01/78	04/15/79	15,968	
96	272	NJ 18-6	R	Shell	11/09/77	272-1	01/10/78	12/30/78	02/19/79	13,500	
46	684	NJ 18-3	R	Exxon	11/09/77	684-2	06/13/78	01/05/79	07/15/79	16,800	
75	17	NJ 18-6	E	Mobil	12/14/78	17-1	08/03/78	01/06/79	01/24/79	1,200	
NA	66	NJ 18-6	NA	Chevron	NA	B-3	10/09/78	10/09/78	01/24/79	15,820	OCS-0002
48	718	NJ 18-3	R	Gulf	11/09/77	718-1	07/26/77	01/19/79	03/31/79	12,813	
38	642	NJ 18-3	R	Tenneco	12/19/78	642-2	11/15/78	01/20/79	06/10/79	18,400	86-0077
75	17	NJ 18-6	E	Mobil	12/14/78	17-2	01/19/79	01/26/79	05/14/79	13,992	
38	642	NJ 18-3	R	Texaco	12/19/78	642-1	11/22/78	03/23/79	12/01/79	17,807	
131	495	NJ 18-6	R	Tenneco	06/12/79	495-1	05/09/79	06/12/79	10/11/79	18,300	
9	500	NJ 18-3	R	Exxon	03/22/78	500-1	12/30/76	07/18/79	09/28/79	12,253	
28	598	NJ 18-3	R	Texaco	11/09/77	598-3	10/09/79	12/04/79	05/25/80	16,103	86-0129
29	599	NJ 18-3	R	Exxon	06/01/79	599-1	03/24/80	04/25/80	11/02/80	17,121	
38	642	NJ 18-3	R	Tenneco	12/19/78	642-3	02/12/80	05/27/80	10/14/80	16,475	
81	106	NJ 18-6	E	Murphy	10/02/79	106-1	10/29/79	12/27/79	05/29/80	18,405	86-0117
28	598	NJ 18-3	R	Texaco	11/09/77	598-4	07/11/80	10/21/80	03/24/81	16,050	
55	816	NJ 18-3	R	Exxon	08/10/79	816-1	06/02/80	11/04/80	05/07/81	17,753	
52	728	NJ 18-3	R	Exxon	06/01/79	728-1	01/21/81	05/09/81	07/04/81	15,205	
15	544	NJ 18-3	E	Mobil	05/28/81	544-2	08/06/81	08/28/81	10/01/81	8,312	
337	587	NJ 18-6	R	Shell	01/28/83	587-1	05/06/83	08/02/83	12/26/83	14,500	87-0074
336	586	NJ 18-6	R	Shell	07/22/83	586-1	10/20/83	12/30/83	05/29/84	16,000	86-0099
317	372	NJ 18-6	R	Shell	07/22/83	372-1	04/18/84	05/26/84	07/11/84	11,631	87-0118
370	93	NJ 18-9	R	Shell	12/02/83	93-1	06/22/84	07/14/84	11/07/84	17,740	86-0128
SOUTH ATLANTIC											
NA	387	NH 17-5	NA	Ocean Prod.	NA	GE-1	01/28/77	02/24/77	06/15/77	13,254	OCS-0005
3686	208	NH 17-5	R	Tenneco	11/20/78	208-1	10/30/78	05/29/79	07/09/79	7,754	
3699	427	NH 17-5	R	Tenneco	04/02/79	427-1	04/27/79	07/13/79	08/15/79	7,472	
3664	913	NH 17-2	R	Getty	03/21/79	913-1	01/05/79	08/17/79	09/14/79	7,000	
3671	1005	NH 17-2	R	Transco	05/25/79	1005-1	04/12/79	09/19/79	12/14/79	11,635	
3699	472	NH 17-5	R	Exxon	05/04/79	472-1	05/03/79	10/08/79	11/18/79	7,578	
3705	564	NH 17-5	E	Exxon	09/21/79	564-1	08/20/79	11/19/79	02/12/80	12,863	

(1) R = Relinquished; E = Expired

NA = Not Applicable

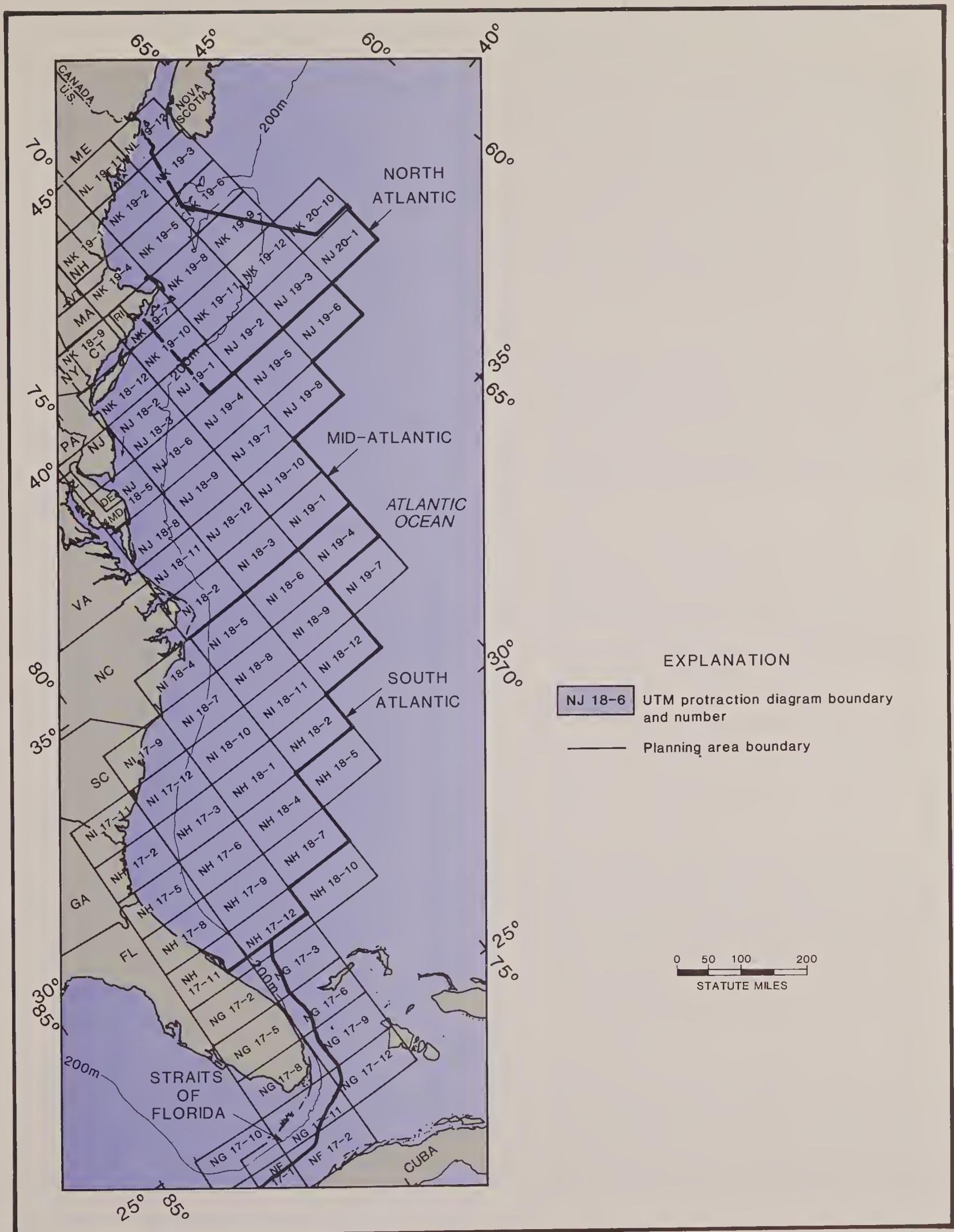


Figure 3-7. Atlantic OCS Region official protraction diagrams.

GULF OF MEXICO OCS REGION

The search for hydrocarbons in the Gulf of Mexico has followed a natural progression from onshore sites, to coastal bays and estuaries, to the continental shelf, and recently to the upper continental slope. As of September 30, 1988, a total of 8,775 exploratory wells have been spudded in the Gulf of Mexico OCS Region. As shown in figure 3-8, over 78 percent of these wells were drilled in the Central Gulf of Mexico Planning Area. Table 3-3 on the next page summarizes the number of exploratory wells drilled by planning area and year since 1954.

Offshore exploration in the Gulf of Mexico began in 1933 with the region's first attempt to drill an offshore well. This well was drilled at a site 6,000 feet offshore in the Creole field off Louisiana by the Pure Oil Company and the Superior Oil Company. It was drilled from a small wooden platform on pilings in 13 feet of water.

In 1947, the Kerr-McGee Oil Company, operating in the Ship Shoal Area off Terrebonne Parish, Louisiana, discovered the Gulf's first commercial offshore oil located completely out of sight of land. The installation consisted of a fixed platform for the rig plus basic machinery. Equipment, supplies, and crew quarters were provided by a small fleet of barges that moved between the platform and a support base at Berwick, Louisiana, 52 miles away. Following this success, the use of onshore support bases became the universal method of operation in offshore development.

Since 1947, exploration in the Gulf of Mexico OCS Region has proceeded rapidly. From 1947 through the late 1970's, exploratory activity focused on areas off the coast of Louisiana. In 1979, industry, while still actively exploring off the coast of Louisiana, looked to other areas within the Gulf of Mexico off the coasts of Texas, Mississippi, Alabama, and Florida.

Most of the activity off Texas in the late 1970's and early 1980's was in water depths less than 150 feet. This activity focused on the Sabine Pass area, on the upper Texas coastline near the Louisiana border, and on the Brazos Ridge, which runs through the south and central offshore area of Texas.

Exploratory wells were also drilled in the Destin Dome, Elbow, Vernon, Pensacola, and Charlotte

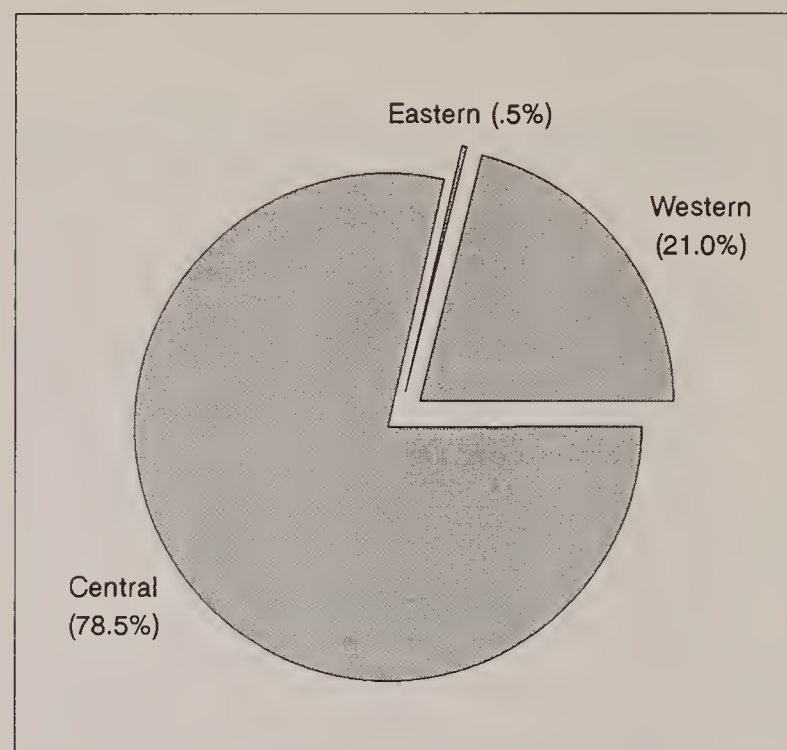


Figure 3-8. Total exploratory wells drilled in the Gulf of Mexico OCS Region by planning area through September 1988.

Harbor areas off the coasts of Mississippi, Alabama, and Florida as industry continued to explore throughout the Gulf of Mexico in the early 1980's. The geology of the Charlotte Harbor area differs from that of the rest of the Gulf of Mexico region. Operators hope that the Sunniland Trend, which is the productive formation in the onshore South Florida Basin, extends offshore. The same types of Cretaceous carbonates underlie both onshore and adjacent offshore areas.

With the introduction of areawide leasing in the Gulf of Mexico during 1983, offshore operators turned their attention to previously unexplored areas within the region. Among the first areas to be considered for new exploration ventures were the deep-water areas of the Mississippi Canyon, Ewing Bank, and Green Canyon leasing areas. Industry interest in these areas stems from Shell Offshore, Inc.'s discovery along the deep-water Flexure Trend in the 1970's. Geologists believe that this trend is an extension of formations found at the mouth of the Mississippi River. (See Chap. 2 of the *Gulf of Mexico Summary Report October 1984 - June 1985* (Lynch and Risotto, OCS Information Report MMS 85-0083), for more information on deep-water drilling.)

Table 3-3. Exploratory wells drilled in the Gulf of Mexico OCS Region by planning area through September 1988

Planning Area	Year Spudded																
	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70
Western	1	4	9	0	1	2	6	12	4	4	21	12	7	10	34	52	23
Central	2	14	32	47	55	84	108	98	144	184	179	157	253	277	260	163	178
Eastern	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal	3	18	41	47	56	86	114	110	148	188	200	169	260	287	294	215	201

	Year Spudded																		
	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	Total
Western	15	13	46	123	111	115	61	99	102	100	70	85	63	175	146	53	107	147	1,833
Central	239	283	245	207	193	163	258	206	230	246	250	287	314	384	338	207	288	327	6,900
Eastern	0	0	0	6	6	0	3	0	2	3	7	0	1	0	6	3	4	1	42
Subtotal	254	296	291	336	310	278	322	305	334	349	327	372	378	559	490	263	399	475	8,775

Although oil prices have declined over the past several years, the deep-water areas of the central and western Gulf, the area adjacent to Mobile Bay, and portions of the eastern Gulf continue to experience high interest, as the industry searches for large oil and gas finds in these relatively unexplored areas.

Representative of industry's continued interest in the deep-water areas of the Gulf of Mexico, Shell Offshore Inc. recently set a new world drilling record when it drilled its No. 1 well on Mississippi Canyon Block 657. Using the Sonat drillship *Discoverer Seven Seas*, Shell spudded this well on November 4, 1987, in 7,520 feet of water. This well was later determined to be producible by MMS and, as such, set a new deep-water discovery record. Table 3-4 (p.76) presents an itemized list of recent deep-water wells drilled on the Gulf of Mexico OCS.

Since 1986, exploratory activities in the Eastern Gulf of Mexico OCS Planning Area have focused on areas offshore the panhandle of Florida. Plans of exploration have been approved for acreage in the Destin Dome, Florida Middle Ground, and Pulley Ridge areas of the eastern Gulf. A history of the exploratory wells drilled in the Eastern Gulf of Mexico Planning Area is provided in table 3-5 (p.77).

In February 1988, two exploratory wells offshore Florida in the panhandle area were determined capable of producing hydrocarbons in paying quantities. Well No. 1 in Destin Dome Block 111 was drilled by Amoco; this was the first reported discovery in Federal waters in the eastern Gulf of Mexico. Well No. 1 in Destin Dome Block 56 was drilled by Chevron.

The FY 88 Appropriations Act prohibited any leasing or drilling activities to occur in Federal waters south of 26° N. latitude and east of 86° W. longitude in the eastern Gulf of Mexico. As a result of this moratorium, Suspensions of Operations were issued for the 73 leases that are held in that area.

**Table 3-4. Deep-water drilling activity in the Gulf of Mexico OCS Region
from March 1986 through September 1988**

OPD	Block number	Operator	Well number	Well type(1)	Water depth (ft)	Spud date	Plugged & abandoned date
Atwater	471	Shell	1	E	6,794	03/29/87	06/25/87
Ewing Bank	963	Texaco	1	E	1,472	12/11/87	02/25/88
	966	Texaco	1	E	1,755	01/14/88	03/03/88
	966	Texaco	2	E	1,755	03/07/88	03/07/88
	1006	Mobil	1	E	1,783	11/28/87	02/02/88
	1006	Mobil	1	E	1,783	02/04/88	02/04/88
Garden Banks	471	Shell	1	E	2,873	02/23/87	06/03/87
	471	Shell	1	E	2,873	06/03/87	07/07/87
	471	Shell	1	E	2,873	07/08/87	11/16/87
Green Canyon	21	ODECO	3	E	1,296	08/18/87	10/06/87
	29	Placid	1	E	1,522	04/01/88	04/18/88
	32	Amoco	1	E	2,269	08/14/87	09/06/87
	32	Amoco	2	E	2,264	09/07/87	02/25/88
	108	Agip	2	E	1,426	07/21/86	09/26/86
	108	Agip	2	E	1,426	09/27/86	10/29/86
	110	Marathon	2	E	1,754	06/21/87	08/18/87
	110	Marathon	2	E	1,754	08/18/87	08/29/87
	110	Marathon	2	E	1,754	08/30/87	10/31/87
	116	Shell	2	E	2,132	11/20/87	01/13/88
	116	Shell	2	E	2,160	01/11/88	01/23/88
	116	Shell	2	E	2,160	01/23/88	02/06/88
	116	Shell	2	E	2,132	02/08/88	02/18/88
	141	Conoco	1	E	1,720	05/04/87	08/27/87
	147	Texaco	1	E	1,275	03/07/88	03/07/88
	154	Marathon	1	E	1,452	02/12/88	02/12/88
	154	Marathon	1	E	1,452	11/04/87	01/10/88
	154	Marathon	1	E	1,452	01/10/88	02/04/88
	167	Placid	1	E	2,254	08/10/86	12/21/86
	182	Conoco	1	E	1,542	09/21/86	11/08/86
	184	Conoco	A001	D	1,762	08/17/87	09/21/87
	184	Conoco	A002	D	1,762	09/24/87	11/13/87
	184	Conoco	A003	D	1,758	11/16/87	01/11/88
	184	Conoco	A004	D	1,758	01/12/88	01/12/88
	184	Conoco	A005	D	1,758	03/05/88	03/05/88
	205	Exxon	1	E	2,650	---	02/17/88
	228	Conoco	3	E	1,256	11/11/86	12/16/86
	228	Conoco	4	E	1,950	08/28/87	09/30/87
	301	Placid	1	E	3,171	07/17/86	12/17/86
Mississippi Canyon	109	Sohio	2	E	1,205	01/25/87	04/11/87
	201	Texaco	1	E	2,780	12/14/87	01/26/88
	238	Conoco	1	E	1,452	01/24/87	03/03/87
	285	Texaco	1	E	3,161	07/03/87	12/10/87
	285	Texaco	2	E	2,900	01/30/88	02/08/88
	383	Shell	1	E	5,759	06/27/87	09/07/87
	487	ARCO	1	E	1,465	02/19/88	03/01/88
	502	Amoco	1	E	2,450	03/09/88	03/11/88
	505	Shell	1	E	3,174	08/28/86	11/18/86
	583	Shell	1	E	2,150	09/09/87	11/05/87
	657	Shell	1*	E	7,520	11/07/87	02/01/88
	657	Shell	1*	E	7,520	02/01/88	02/17/88
	709	ARCO	1	E	2,599	12/23/86	03/10/87
	709	ARCO	2	E	2,488	03/14/87	06/23/87
	709	ARCO	1	E	2,599	12/23/86	03/10/87
	720	ARCO	1	E	3,365	---	02/26/88
	731	Shell	1	E	5,400	11/20/86	02/23/87
	731	Shell	1	E	5,400	02/23/87	03/23/87
	786	Shell	1	E	7,450	02/18/88	03/11/88
	839	Placid Oil	1	E	1,952	07/04/86	09/28/86
	929	Conoco	1	E	2,250	10/05/87	12/07/87
Viosca Knoll	825	Texaco	1	E	1,710	08/08/87	08/18/87
	873	Shell	1	E	3,810	02/21/88	02/24/88
	956	Shell	2	E	3,553	02/20/87	05/06/87
	956	Shell	2	E	3,553	05/06/87	06/10/87
	956	Shell	2	E	3,553	06/11/87	07/06/87
	956	Shell	2	E	3,553	07/07/87	08/06/87
	989	Sohio	2	E	1,250	04/17/87	06/27/87
	989	Sohio	3	E	1,230	06/30/87	08/18/87

(1) E = exploration; D = development.

* World deep-water drilling record.

Table 3-5. Exploratory wells drilled in the Eastern Gulf of Mexico OCS Planning Area as of September 1988

OPD	Block number	Lease number (OCS-G)	Operator	Well number	Water depth (ft)	Spud date	Plugged & abandoned date	Total depth (ft)
Charlotte Harbor	144	3906	Gulf Oil Corp.	1	173	04/09/80	08/14/81	11,362
	188	3909	Odeco Oil & Gas	1	180	06/26/81	09/04/81	11,360
	265	3912	Shell Offshore, Inc.	1	324	01/02/81	04/09/81	12,362
	622	4950	Shell Offshore, Inc.	1	234	05/10/86	06/21/86	10,550
	628	3915	Mobil Oil E & P	1	200	03/29/81	04/12/81	1,270
	672	3917	Tenneco	1	190	12/17/80	04/08/81	11,302
De Soto Canyon	512	6472	Shell Offshore, Inc.	1	1,976	04/26/86	06/21/86	12,300
Destin Dome	31	2502	Amoco Production	1	188	12/03/77	12/14/77	18,338
	56	6406	Chevron USA, Inc.	1 TA	187	06/12/87	01/26/88	--
	111	8338	Amoco Production	1	389	06/10/87	10/16/87	--
	118	2492	Exxon Corp.	1	239	09/04/74	09/29/74	7,075
	118	2492	Exxon Corp.	2	232	01/08/75	01/27/75	7,507
	160	6417	Shell Offshore, Inc.	1 TA	281	01/01/85	05/02/85	7,764
	160	6417	Shell Offshore, Inc.	2	292	05/09/85	08/16/85	16,953
	162	2486	Exxon Corp.	1	245	07/07/74	09/03/74	10,930
	162	2486	Exxon Corp.	2	262	11/27/74	01/07/75	10,418
	162	2486	Exxon Corp.	3	258	03/02/75	06/12/75	17,938
	166	2490	Fina Oil	1	145	10/21/74	03/09/75	17,608
	207	2480	Exxon Corp.	1	280	02/18/75	03/03/75	4,800
	250	2472	Exxon Corp.	1	296	01/30/75	02/17/75	6,634
	284	6423	Exxon Corp.	1	607	06/28/85	11/15/85	17,500
	360	2468	Gulf Oil Corp.	1	300	04/21/75	10/02/75	20,988
	422	6438	Chevron USA, Inc.	1	591	07/01/85	12/21/85	22,222
	529	3888	Shell Offshore, Inc.	1	227	03/05/80	06/28/80	20,450
	563	3890	Sohio Petroleum	1	275	11/19/81	07/29/82	21,068
	617	2463	Chevron USA, Inc.	1	446	09/19/77	10/15/77	10,513
Florida Middle Ground	252	2516	Texaco, Inc.	1	126	09/22/74	01/26/75	15,663
	455	8363	Tenneco	1	470	09/24/86	11/08/86	--
Gainesville	707	6456	Sohio Petroleum	1	70	06/07/85	11/08/85	15,941
Pensacola	948	6391	Sohio Petroleum	1	164	02/16/85	10/14/85	18,958
	948	6391	Tenneco	2 ST	159	06/07/87	10/07/87	--
	948	6391	Tenneco	2 TA	159	10/14/87	01/19/88	--
	973	3886	Mobil Oil E & P	1	90	04/17/81	11/01/81	23,264
	996	6396	Texaco, Inc.	1	160	04/08/88	DRL	--
St. Petersburg	7	2527	Shell Oil	1	126	10/24/74	05/09/75	18,443
	100	2523	Texaco, Inc.	1	107	01/27/75	05/26/75	17,388
The Elbow	566	3344	Mobil Oil E & P	1	220	04/05/77	10/03/77	15,865
	915	3341	Mobil Oil E & P	1	370	01/03/81	06/01/81	18,128
Vernon Basin	654	3903	Mobil Oil E & P	1	455	01/28/81	04/05/81	10,768

DRL = Drilling; ST = Sidetrack Well; TA = Temporarily Abandoned

PACIFIC OCS REGION

There have been 322 exploratory wells spudded on the Pacific OCS since the first exploratory well was spudded by Shell Oil Company in the Central California Planning Area in 1963. From 1963 through 1967, a total of 38 exploratory wells were drilled by six offshore operators in all four of the Pacific OCS planning areas; this includes six wells drilled on drainage tract, Lease OCS-P 0166 in the Carpinteria field.

Following Phillips Petroleum Company's delineation drilling in Federal waters of the extension of the Carpinteria Offshore oil field in 1967, exploration activities focused on the Southern California Planning Area, with a record number of 38 exploratory wells drilled on the Pacific OCS in 1968. This exploratory activity in 1968, which led to the discovery of the Dos Cuadros, Government Point, and Pitas Point fields in the Santa Barbara Channel, increased industry's interest in the oil and gas potential of the Pacific OCS Region.

On January 28, 1969, a blowout occurred at Union's Platform A in the Dos Cuadros field, resulting in a major oil spill. This event caused a public outcry against offshore drilling and prompted the Secretary

of the Interior to suspend all operations on Federal leases in the Santa Barbara Channel for several years.

As a result of the first lease sale in the Pacific OCS Region following the Santa Barbara Channel oil spill, exploration activities increased from 1974 through 1977, as industry further defined the oil and gas potential of the Southern California Planning Area. After a slight decline, exploration began a steady increase in the early 1980's, as lease sales in both central and southern California offered new acreage for offshore operators to explore.

In 1983 and 1984, industry began an extensive search in the Monterey Formation off southern California. This search resulted in 18 wells being determined to be producible by MMS. Since this time, the pace of exploratory drilling in the Pacific OCS has declined, as offshore operators focused their attention on development and production operations.

The success of the Pacific OCS exploratory drilling program is evident with the discovery of 24 offshore fields in this region. Each of these fields is located in the five offshore development regions discussed in the next section. Figure 3-9 below displays the number of exploratory wells drilled by planning area per year on the Pacific OCS. Table 3-6 provides

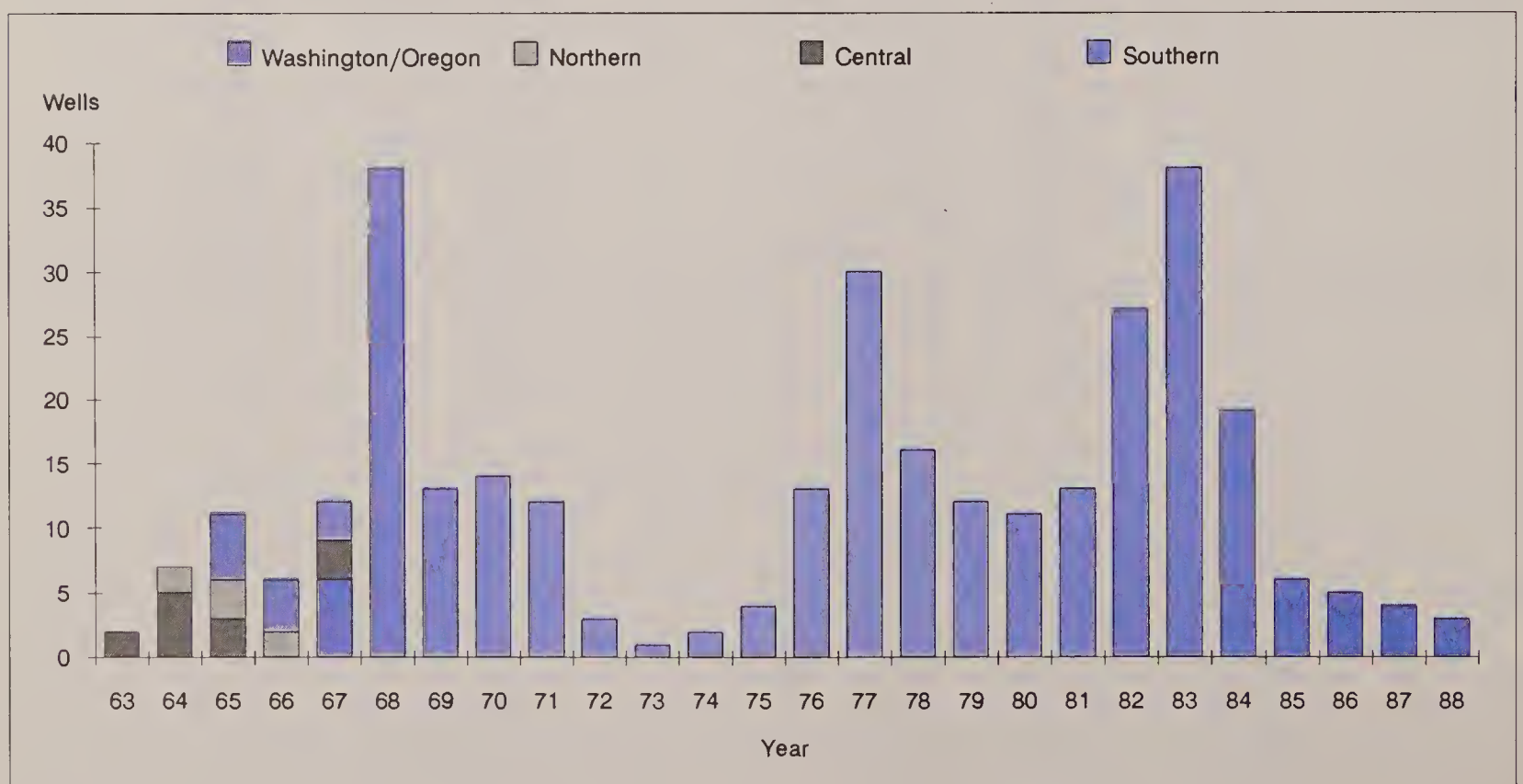


Figure 3-9. Exploratory wells drilled in the Pacific OCS Region by planning area, 1963 through September 1988.



[Replaces Figure 3-9 on Page 78]

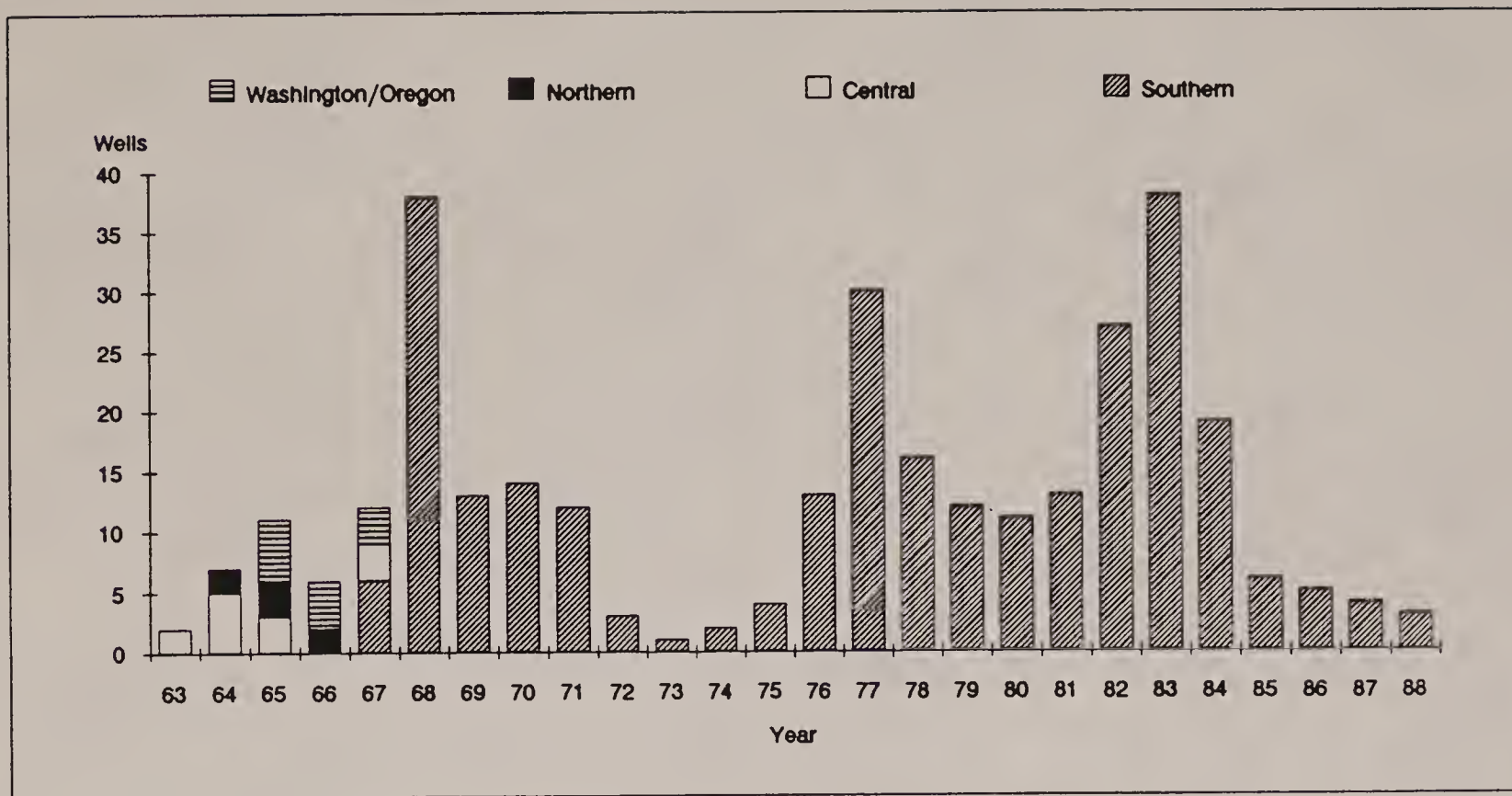


Figure 3-9. *Exploratory wells drilled in the Pacific OCS Region by planning area, 1963 through September 1988.*

Table 3-6. Exploratory wells drilled in the Pacific OCS Region by OPD location through September 1988

OPD number	Year Spudded																												Total
	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88			
6A	.....	.....	.....	.....	.....	9	7	9	11	2	.....	.....	.....	.....	1	4	1	7	10	10	7	1	2	.....	1	2	84		
6B	.....	.....	.....	.....	6	29	6	5	1	1	1	2	4	5	6	8	9	3	2	4	6	8	.....	2	2	.....	110		
6C	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7	19	4	1	.....	1	.....	.....	.....	.....	.....	.....	.....	32		
6D	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	4	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	7		
NI 10-3	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	3	1	1	1	.....	.....	8		
NI 10-6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	12	22	9	3	2	.....	.....	48		
NJ 10-2	.....	.....	1	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3		
NJ 10-5	1	4	2	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8		
NJ 10-8	1	.....	1	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4		
NK 10-1	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1		
NK 10-7	.....	2	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4		
NL 10-4	.....	.....	1	3	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6		
NL 10-10	.....	.....	4	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5		
Total	2	7	11	6	12	38	13	14	12	3	1	2	4	13	30	16	12	11	13	27	38	19	6	5	3	2	320		

annual totals of wells drilled by map area on the Pacific OCS. Figure 3-10 on the next page depicts the location of these map areas. Each of these OPD's may be ordered from the Pacific OCS regional office at the following address:

Pacific OCS Region
Minerals Management Service
1340 West 6th Street
Los Angeles, CA 90017

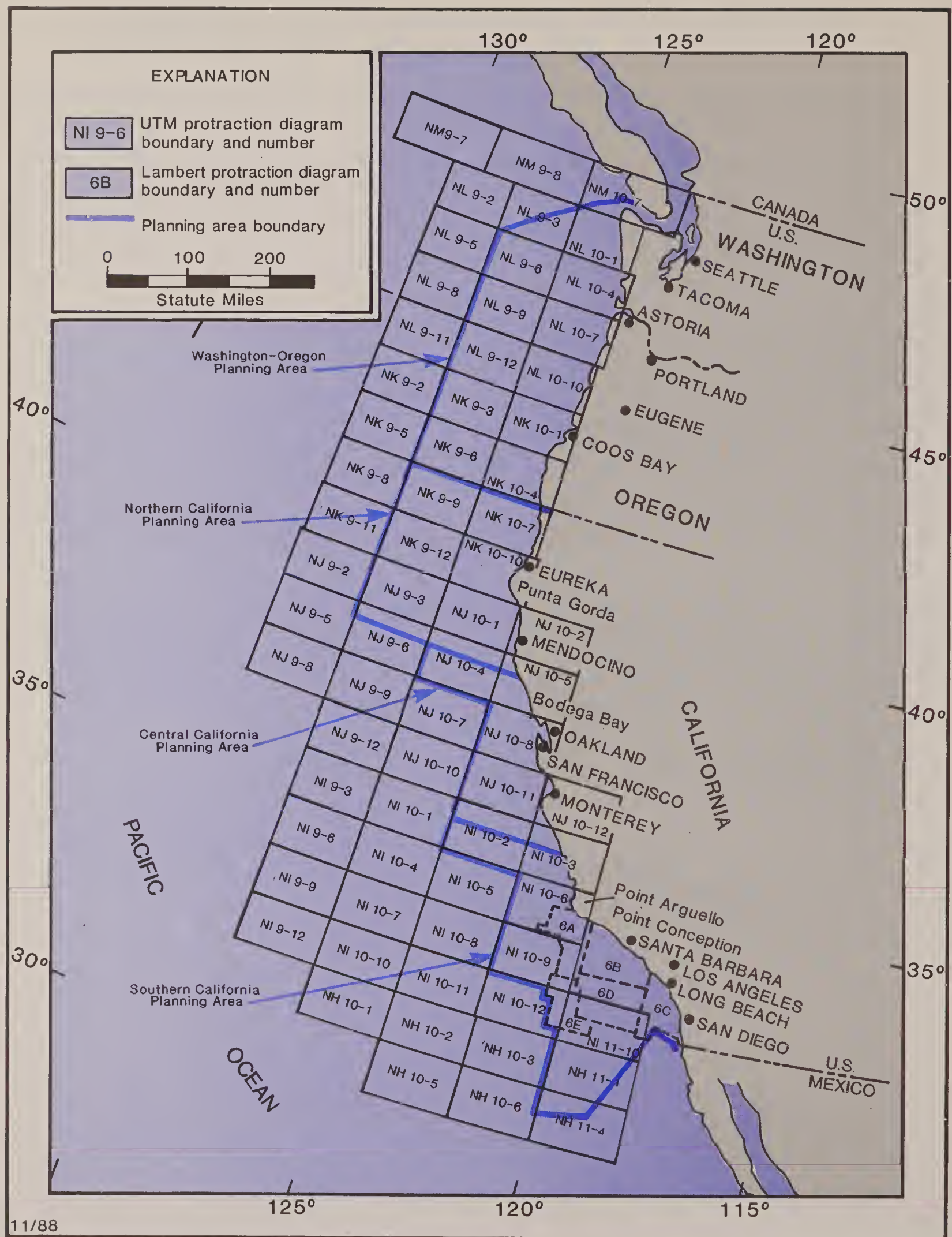


Figure 3-10. Pacific OCS Region official protraction diagrams and leasing maps.

Development Phase of Postlease Activities

The development phase of the postlease process begins when a company determines that production from a discovery is economically feasible. Before development can proceed, a detailed Development and Production Plan (DPP), or a Development Operations Coordination Document (DOCD) for areas in the western Gulf of Mexico, is prepared by the company and reviewed and approved by MMS. A DPP must include (1) the specific work to be performed; (2) a description of drilling vessels, platforms, pipelines, or other facilities and operations located offshore and onshore, including safety and pollution prevention and control features and labor, material, and energy requirements; (3) the well locations; (4) current interpretations of all available relevant geological and geophysical data, which may include proprietary data; (5) a description of environmental safeguards and safety standards; (6) a time schedule of development and production activities; (7) an oil-spill contingency plan that sets forth the procedures, personnel, and equipment to be used for preventing, reporting, and cleaning up spills of oil and waste material; and (8) such data as the MMS Director may require. (For a more detailed description of what is required in a DPP please refer to the April 1, 1988, *Federal Register* notice, related to 30 CFR Parts 250 and 256, page 10706.) A flow chart of the MMS development and production plan review process is presented in figure 3-11 on the next page. After the necessary permits and approvals have been obtained, one or more platforms are installed to develop and produce the discovery.

ALASKA OCS REGION

Although several discoveries have been made on the Alaskan OCS, including eight wells receiving determinations of producibility by MMS within the Beaufort Sea Planning Area, no development or production activities have yet been undertaken. Because of the current market conditions and the high development and transportation costs, large field or multiple field discoveries in nearby leases may be necessary to justify the cost of codeveloping these areas. Once the offshore infrastructure is in place in the region, however, these discoveries, along with a number of the smaller discoveries, may then become commercially developable. This offshore infrastructure can then be linked to the onshore infrastructure already

in place as a result of production from a number of large discoveries within the State of Alaska.

ATLANTIC OCS REGION

As is the case in the Alaska OCS Region, there is no development or production in the Atlantic OCS Region. There have been a few small discoveries of oil and natural gas in the Mid-Atlantic Planning Area off the coast of New Jersey. If these discoveries had been made in a region having established infrastructure, such as the Gulf of Mexico, these discoveries would have been determined commercial.

GULF OF MEXICO OCS REGION

Historically, development in the Gulf of Mexico, like all other aspects of the Federal OCS Program, is greatest in the central Gulf of Mexico. Figure 3-12 (p. 83) shows that 74 percent of the approved development plans submitted to MMS were for blocks in the Central Gulf of Mexico Planning Area. This trend is still continuing today. Between 1986 and 1988, MMS approved plans covering proposed development activities nearly five times as often in the central Gulf of Mexico as in the western Gulf of Mexico. There have been no development activities in the Eastern Gulf of Mexico Planning Area.

Figure 3-13 (p. 83) shows the number of development wells drilled in the Gulf of Mexico OCS Region by planning area and year. Table 3-7 (p. 84) lists the number of development wells drilled by map area. Figures 3-14 (p. 85) and 3-15 (p. 86) present the location of each of these map areas. Each of these maps may be ordered through the Gulf of Mexico OCS Regional office at the following address:

Gulf of Mexico OCS Region
Minerals Management Services
1201 Elmwood Park Boulevard
New Orleans, LA 70123-2394

As table 3-8 (p. 87) indicates, development in deeper water of the Gulf of Mexico is progressing. During 1988, several new deep-water records were set.

Placid Oil Company set several new water depth records, as production from Green Canyon Block 29 and Ewing Bank Block 999 started on October 13,

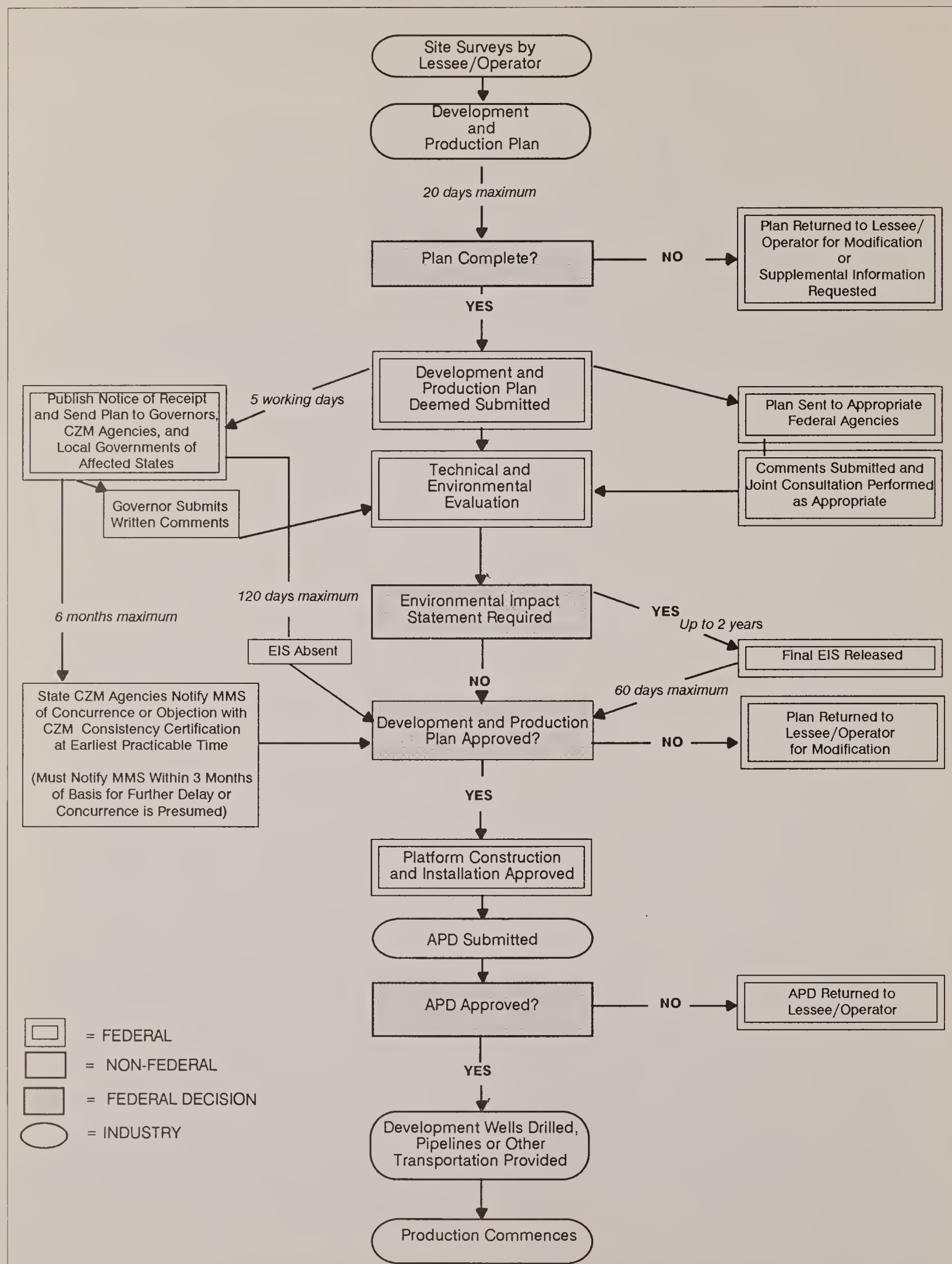


Figure 3-11. Development and Production Plan review process.

1988. The project implements the first floating/subsea production system composed of a modified semisubmersible that is linked by a pipeline system to a shallow-water processing platform.

The Ewing Bank Block 999-1 subsea satellite well established a new Gulf of Mexico water-depth production record of 1,462 feet. This depth surpassed the 1,025 foot mark held by Shell Offshore, Inc.'s Platform Cognac. However, this record, as well as the world record of 1,613 feet, held by Petroleo Brasileiro SA's 3-RJS-376-D well in Marimba field off Rio de Janeiro, was exceeded when the Green Canyon 31-4 began production in 2,243 feet during the last week of October 1988.

Shell Offshore, Inc. broke the world record for the tallest offshore structure when it installed its Platform Bullwinkle in 1,350 feet of water on Green Canyon Block 65 during the fall of 1988. Bullwinkle stands 1,615 feet tall eclipsing Exxon's Platform Lena, which held the record at 1,305 feet. Shell anticipates that production from Bullwinkle will start in 1989.

Conoco, Inc. has begun installation of the first tension-leg well platform (TLWP) in the Gulf of Mexico on Green Canyon Block 184. In September 1988, Conoco, Inc. and partners landed the 1,400-ton foundation template that will anchor its Joliet field

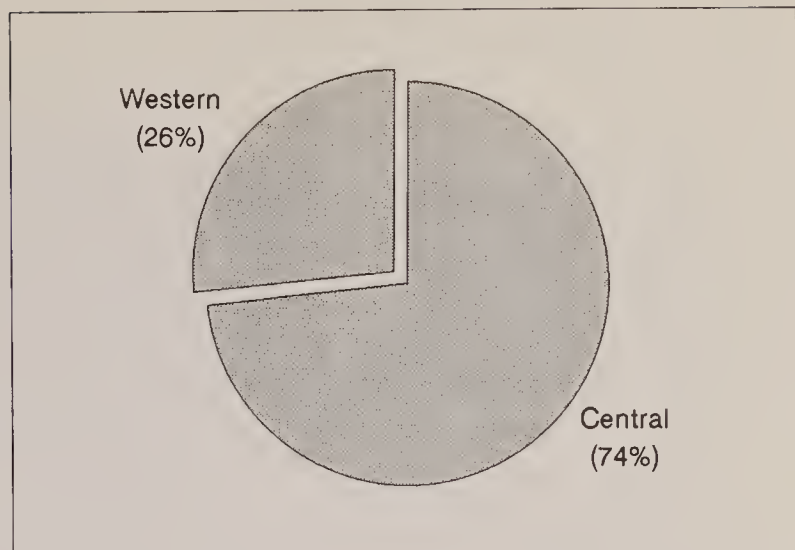


Figure 3-12. Development plans approved in the Gulf of Mexico OCS Region by planning area, 1983 through September 1988.

TLWP in 1,760 feet of water. Eleven of the field's proposed 20 development wells have been drilled. Drilling operations were interrupted when the foundation template was placed over the drilling template.

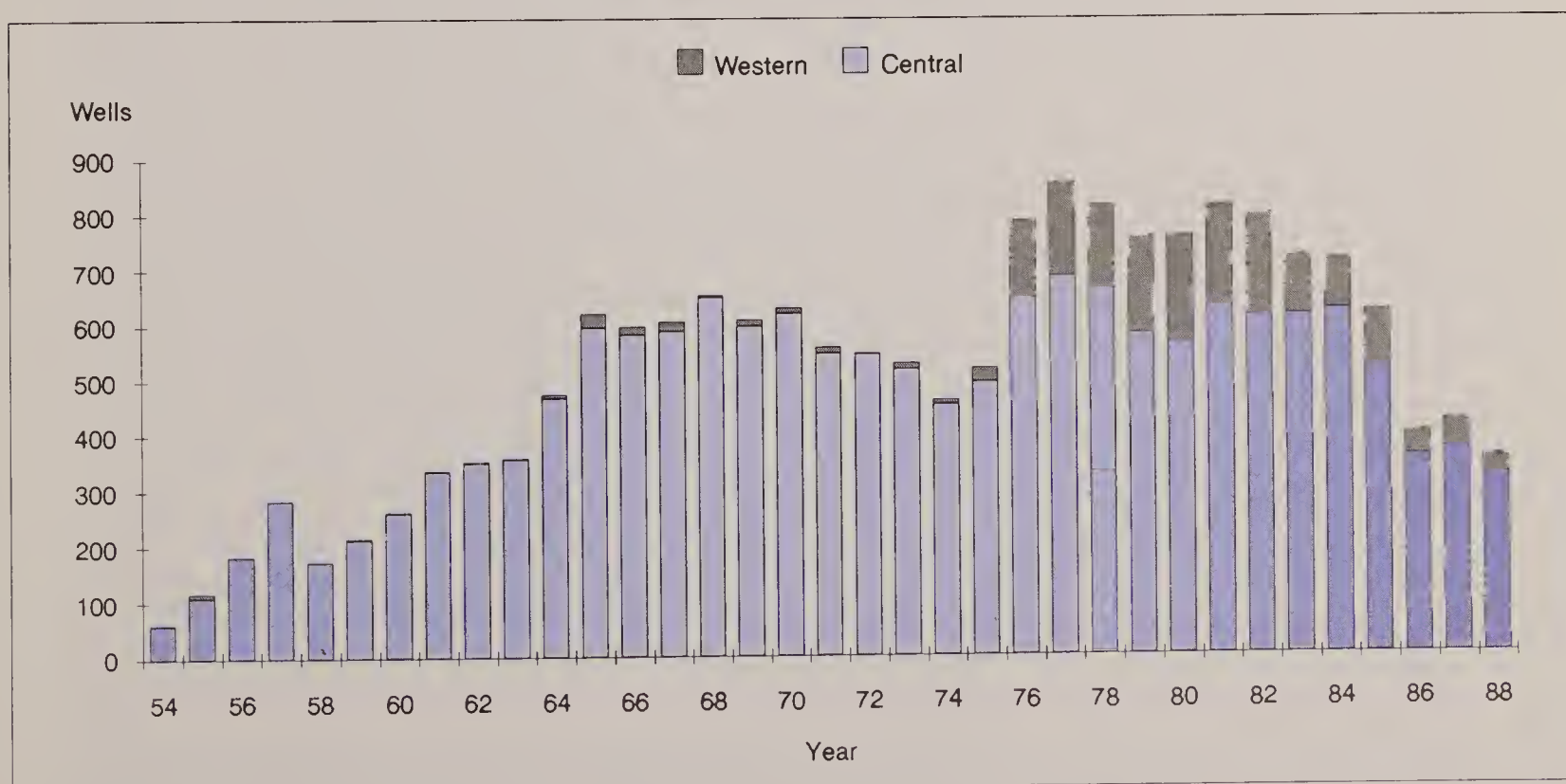


Figure 3-13. Total number of development wells drilled in the Gulf of Mexico OCS Region by planning area through September 1988.

Table 3-7. Total number of development wells drilled in the Gulf of Mexico OCS Region by OPD location through September 1988

Map area*	No. of development wells drilled by year																																				Total
	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88		
LA1	13	12	23	10	5	8	21	15	8	4	6	10	11	6	23	12	41	33	29	18	17	22	23	38	42	36	21	16	37	27	31	12	3	18	4	655	
LA10	2	0	1	6	2	1	0	1	2	19	14	72	54	23	16	23	29	38	8	11	27	4	4	11	18	7	15	42	26	23	41	46	13	13	6	618	
LA10A	0	0	0	0	0	0	0	0	0	0	2	0	3	10	36	50	82	30	4	2	7	4	16	16	4	19	29	11	31	25	46	13	7	23	16	486	
LA11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	1	1	0	2	0	3	13		
LA12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	8	16	5	0	1	4	2	0	0	37	
LA1A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	19	19	3	5	4	4	3	2	0	2	4	2	71	
LA1B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	10	21	43	74	62	57	43	45	30	33	16	26	43	15	2	5	6	534	
LA2	6	3	6	22	13	1	8	6	11	5	1	4	11	18	15	12	10	12	8	14	2	13	23	13	23	15	19	31	21	18	29	16	0	9	6	424	
LA2A	0	0	0	0	0	0	0	0	0	2	0	1	1	0	0	0	7	21	61	50	25	46	23	17	23	19	21	35	15	19	16	15	6	10	13	446	
LA3	1	2	13	19	17	22	14	17	20	15	20	23	31	9	14	34	21	12	36	45	13	24	57	26	29	33	26	37	29	33	21	27	16	33	12	801	
LA3A	0	0	0	0	0	0	3	8	16	27	33	44	51	51	35	30	23	12	14	8	7	0	3	27	13	18	6	9	7	9	13	4	6	9	14	500	
LA3B	0	0	0	0	0	0	0	0	0	0	2	2	1	0	0	5	7	20	18	32	26	18	29	58	50	53	39	15	13	26	12	14	2	2	4	448	
LA3C	0	0	0	0	0	0	0	1	0	6	10	4	3	2	9	4	2	4	6	2	1	14	77	125	60	30	35	27	50	17	14	22	23	0	8	556	
LA3D	0	0	0	0	2	4	8	12	11	3	0	1	6	8	4	1	1	4	3	15	20	25	25	27	22	12	9	15	9	19	15	12	2	6	5	306	
LA4	21	31	38	46	23	29	40	21	11	14	48	54	56	51	38	58	45	82	48	38	41	13	20	24	28	19	23	40	35	71	48	15	5	16	16	1,206	
LA4A	0	0	0	0	0	0	0	1	0	0	8	14	17	6	6	17	18	22	78	107	112	64	94	52	36	41	58	33	54	29	27	66	28	15	26	1,029	
LA5	2	11	44	35	11	13	12	31	31	24	29	41	32	64	113	79	89	91	90	39	13	35	50	41	34	32	45	55	56	64	75	45	25	15	15	1,481	
LA5A	0	0	0	0	0	0	0	0	2	2	18	15	4	1	17	18	23	24	8	12	13	13	15	22	32	26	12	24	10	8	4	5	12	9	9	358	
LA6	6	18	8	39	30	34	30	54	65	72	72	110	122	123	77	53	75	25	21	32	10	21	30	28	64	69	55	68	67	45	45	44	19	37	21	1,689	
LA6A	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	11	11	25	12	12	9	7	92		
LA7	5	8	11	37	28	53	61	72	55	31	40	36	49	94	73	60	17	21	32	11	25	5	1	5	10	3	6	4	12	13	23	19	32	27	18	997	
LA7A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	14	7	0	0	0	0	0	0	1	2	1	5	2	0	0	36	
LA8	4	24	38	68	29	18	29	43	76	102	127	137	120	88	91	65	75	52	43	14	10	20	16	25	28	26	17	22	39	35	29	35	37	29	18	1,629	
LA8A	0	0	0	0	0	0	0	0	1	6	7	2	3	22	8	9	10	20	1	0	3	7	6	3	4	6	8	7	4	0	1	1	5	2	0	146	
LA9	0	0	0	0	12	28	32	51	40	21	30	19	6	4	26	21	16	8	25	34	22	40	34	25	25	19	24	34	29	47	21	20	14	17	19	763	
LA9A	0	0	0	0	0	0	0	0	0	0	0	0	3	1	7	46	45	27	11	1	6	0	14	27	13	35	25	11	13	9	27	20	25	29	34	34	463
NG15-01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	16	16	11	17	2	12	10	85
NG15-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	7	2	2	0	0	0	1	16	
NG15-03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	3	13	19	39	
NH15-12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	9	0	4	17	
NH16-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	
NH16-07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	3	10	11	3	0	0	0	0	0	2	0	1	0	38	
NH16-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	18	40	31	13	11	14	23	34	11	13	212	
TEX2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	0	0	0	0	7	0	15	
TEX2A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	10	
TEX3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	4	12	5	1	7	11	1	0	7	51		
TEX3A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	4	2	4	2	6	5	5	0	4	1	0	35		
TEX4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	7	25	19	34	33	20	9	8	3	6	167		
TEX5	0	0	0	0	0	0	0	0	0	0																											

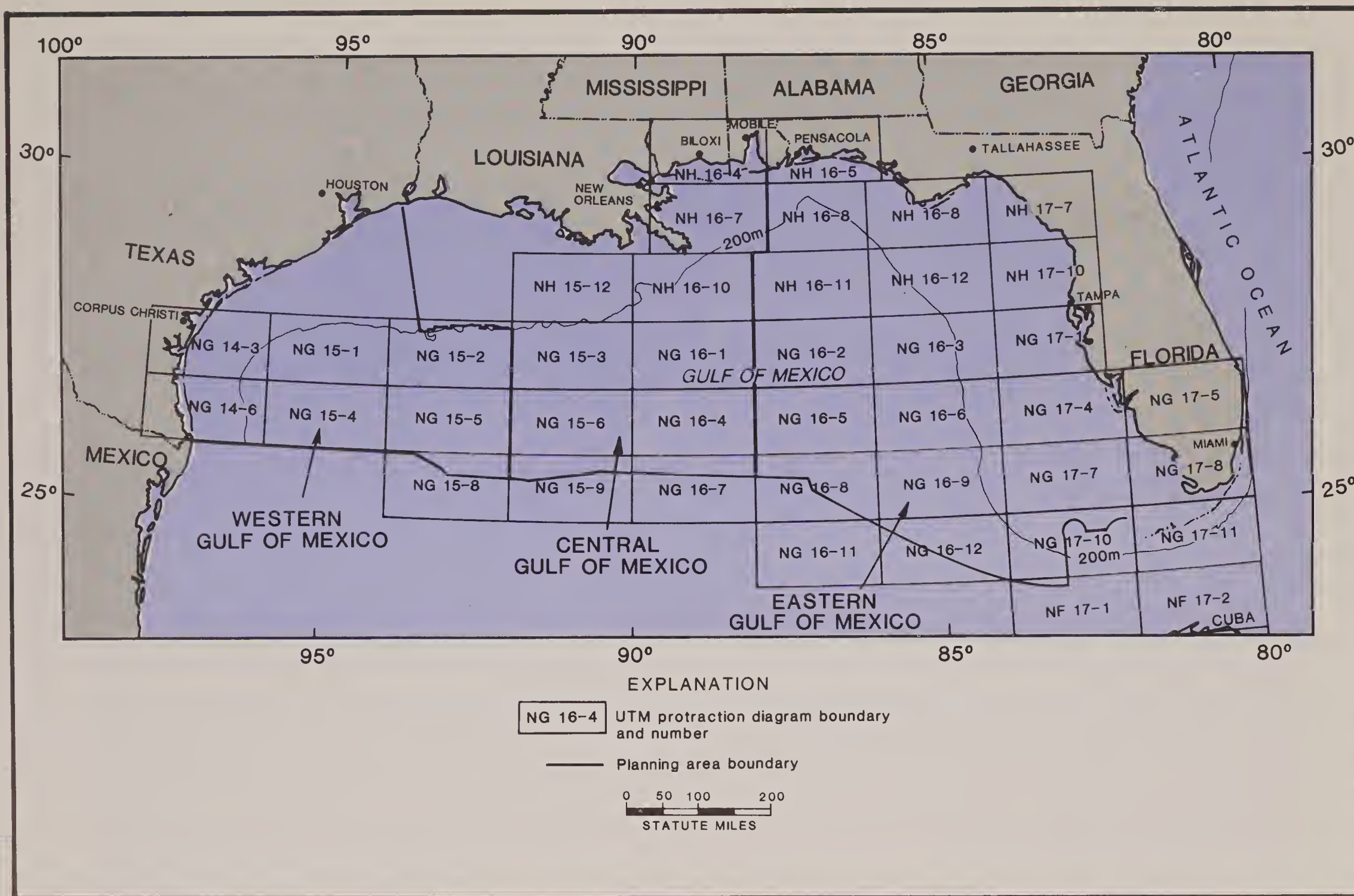


Figure 3-14. Gulf of Mexico OCS Region official protraction diagrams.

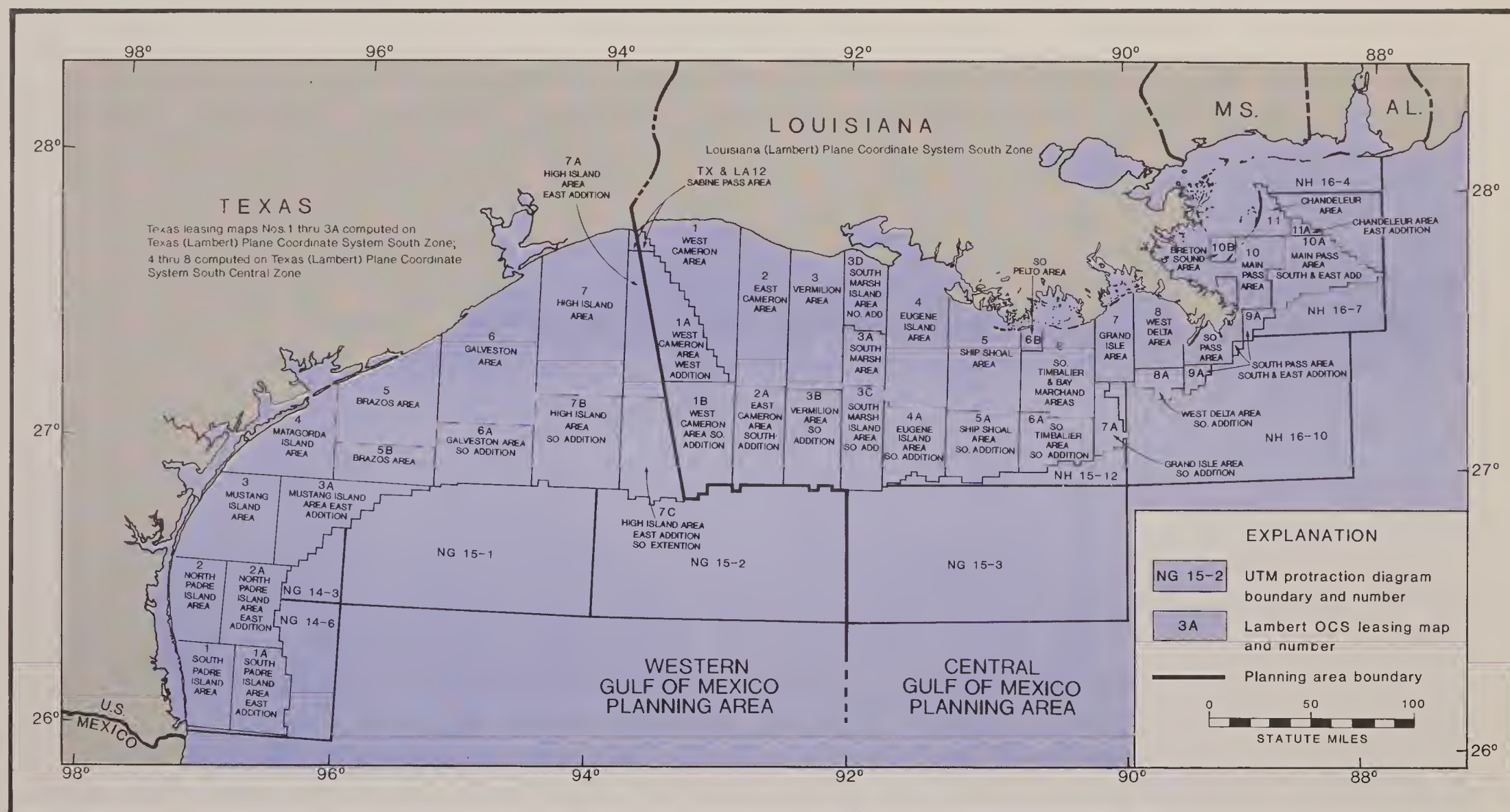


Figure 3-15. Gulf of Mexico OCS Region leasing maps.

Table 3-8. Selected Gulf of Mexico OCS Region deep-water projects as of September 1988

Administrative area/ block number	Operator	Water depth (ft)	Production structure/system (Project name)	Status
Green Canyon 184	Conoco	1,760	Tension-leg wellhead platform	Installation began in September 1988
Green Canyon 21	ODECO	1,270	Unknown	Systems under study/field delineation drilling
Green Canyon 110	Marathon	1,300	Unknown	Systems under study/field delineation drilling
Green Canyon 39	Placid	1,640	Floating production platform	In design
Green Canyon 65	Shell	1,350	Fixed steel platform (Bullwinkle)	Installation during 1988 Production start-up in 1989
Green Canyon 60	Standard	1,100	Fixed steel platform	Field delineation drilling
Green Canyon 29, 31 and Ewing Bank 999	Placid	1,534	Floating production platform	Production start-up in 1988
Mississippi Canyon 335, 354, 398, 399	Exxon	1,211-1,600	Floating production platform (Zinc Prospect)	Planning/engineering - delayed
Mississippi Canyon 109, 110	Standard	1,086	Unknown	Field delineation drilling
Mississippi Canyon 39	Exxon	1,400	Unknown	Systems under study
Mississippi Canyon 280	Exxon	1,001	Guyed-tower platform (Lena)	Producing/drilling for new horizons
Mississippi Canyon 397	Exxon	1,600	Unknown	Field delineation drilling
Mississippi Canyon 194	Shell	1,025	Fixed steel platform (Cognac)	Producing since 1982

PACIFIC OCS REGION

The first development well was drilled in the Pacific OCS Region in 1968. As figure 3-16 below shows, the number of development wells drilled in the Pacific OCS Region peaked in 1969, and then again in 1982. As table 3-9 on the next page shows, a total of 669 development wells were drilled on the Pacific OCS as of September 30, 1988. This table also presents the name and location of each of the platforms used to drill these wells.

This report discusses only those development and production projects that have been summarized in the past Pacific Summary Reports since 1980. However, other projects have occurred in Federal waters since 1967. The following detailed discussion is possible due to the limited number of projects in the Pacific OCS Region as compared with the Gulf of Mexico OCS Region. Included in this section are discussions on the onshore support necessary to complete these projects.

Point Arguello and Gaviota. -- The Point Arguello field, located in the southern Santa Maria Basin, was discovered by Chevron in 1981. After more than 5 years in the permitting process, Chevron and Texaco have secured the requisite permits for both the onshore and offshore components of their Development and Production Plan (DPP) for this project. Under the terms of their permits, Chevron and Texaco will funnel all production from the Point Arguello field to Chevron's Platform Hermosa from which production will be piped to shore in two pipelines. The landfall for these two pipelines lies

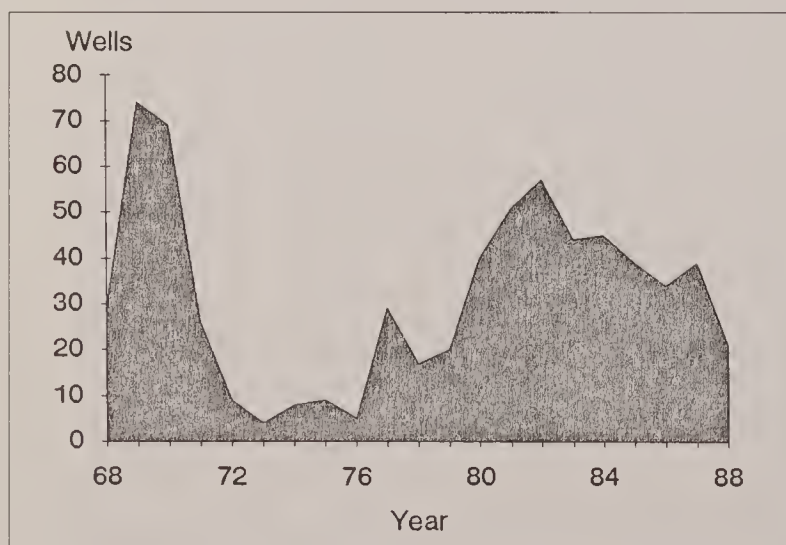


Figure 3-16. Total number of development wells drilled in the Pacific OCS Region through September 1988.

just north of Point Conception; the onshore route parallels the coastal terrace from the landfall to a new oil and gas processing facility that is being built at Gaviota by Chevron. Oil will be transported in a 24-inch line by the Point Arguello Pipeline Company (PAPCO), and natural gas will be transported in a 20-inch line by the Point Arguello Natural Gas Line Company (PANGL). The above two pipelines are known together as the Point Arguello Offshore System (PAOS).

At Gaviota, oil will be dehydrated at the PAPCO oil separation and treatment plant. After dehydration, up to 100 thousand barrels per day (Mbd) of the crude initially will be transported by tanker from Texaco's Gaviota Interim Marine Terminal to Chevron's and Texaco's refineries in the Los Angeles area (see discussion on the Gaviota terminal that follows). Crude will be transported by pipeline to Los Angeles in the future if the Southern California Pipeline System (SCPS) is built. Current plans also call for the PAPCO oil plant to be connected to the new consolidated marine terminal proposed for offshore Las Flores Canyon, if it is built.

Natural gas will be processed at an adjoining facility operated by the Gaviota Gas Plant Company (GGPC). Clean sales-gas processed by the GGPC will be sold to the Southern California Gas Company (SoCal) and tied in to one of SoCal's existing distribution pipelines that crosses the plant property. Natural gas liquids (NGL) and liquid petroleum gases (LPG) will be blended with the crude oil for transport to markets in the Los Angeles and Bakersfield areas by truck until a pipeline is built for this purpose.

As a condition established by the Joint Review Panel (JRP), the combined EIR/EIS that was prepared for the Point Arguello project included a southern Santa Maria Basin area study that attempted to consider foreseeable development through 1993. As a result of this study, the offshore pipeline network and the PAPCO-GGPC plant at Gaviota are sized to accommodate future production up to 250 Mbd of crude oil emulsion and 120 million cubic feet per day (MMcfd) of natural gas. Chevron is studying development of its Rocky Point Unit that would entail installation of Platform Hacienda on Lease OCS-P 0451. This platform was the only one projected by the Southern Santa Maria Basin area study. If Platform Hacienda is eventually installed, resulting production would be tied into the PAPCO and PANGL lines and transported to Gaviota for separation and treatment and processing.

Postleaste Activities on the OCS 89

(1) The annual well count is determined by spud date. Well count includes all producing and shut-in oil and gas wells and those wells that are either plugged and abandoned, suspended, or actively drilling.

(2) Platform Ely is a processing platform from which no wells will be drilled. Only initial treatment and storage will be done there.

(3) Also on this lease Exxon operates an offshore storage and treating vessel (OS&T) that separates and treats production from Platform Honda.

N/A Not Applicable.

Chevron and Texaco installed Platform Hermosa on Lease OCS-P 0316 and Platform Harvest on Lease OCS-P 0315, respectively, during 1985; Chevron subsequently installed Platform Hidalgo in 1986. The PAPCO and PANGL pipelines were installed during 1986 and early 1987 from Platform Hermosa to the PAPCO-GGPC facility at Gaviota.

Initial startup of this project has been delayed because of concern over onshore pipeline safety. In May of 1988, the County decided to prepare a supplemental environmental impact report (SEIR) to assess the potential public safety and environmental impacts caused by the higher levels of hydrogen sulfide in the produced gas. The draft SEIR was published on August 5, 1988. The public comment period for the draft SEIR closed September 9, 1988.

Initial permitting for an expansion of the existing **Gaviota Marine Terminal** as a multiple-use industry facility was undertaken by Getty Oil in early 1983 before its merger with Texaco. On February 16, 1985, the Santa Barbara County Planning Commission, and later the Board of Supervisors, conditionally approved Gaviota as the preferred site for a consolidated marine terminal on the county's south coast. This decision was made in response to an alternative marine terminal siting study conducted as part of the draft EIR for the Gaviota proposal. On April 4, 1985, Exxon, Texaco, and Chevron (later joined by Sun and Phillips) asked the County Board of Supervisors to withdraw the Texaco application in favor of establishing the consolidated marine terminal at a site offshore Las Flores Canyon. As part of this proposal, the companies proposed using the Gaviota terminal on an interim basis until pipelines to Texas and to the Los Angeles area were built at the Las Flores site (see related development in the Santa Ynez Unit). The companies proposed to own and operate the facility through the Gaviota Terminal Company.

In October 1985, the County approved proposals for both the Gaviota Interim Marine Terminal and the Las Flores Consolidated Marine Terminal. This approval authorized facility expansion and loading operations at the Gaviota terminal until July 1, 1990. If, at this time, neither the aforementioned pipelines nor the consolidated marine terminal is constructed, the Gaviota Terminal Company will have to petition the County to continued operations. If either of these options is available, the offshore moorings will be removed and offshore pipelines will be sealed and abandoned in place. The company will be allowed to retain the newly approved tanks for use as a pipeline

storage station, but other storage facilities will be removed.

As approved in May 1987 by the County Planning Commission and the Board of Supervisors, the Gaviota Interim Marine Terminal will consist of (1) total onshore oil storage tank capacity of 753 thousand barrels (Mbbl), including existing capacity of 275 Mbbl, an addition of two new 239-Mbbl tanks and, if needed, a later addition of one new 80-Mbbl tank; (2) a relocated 6-point offshore mooring situated 3,500 feet offshore in water about 60 feet deep at mean tide; and (3) a dedicated fleet of tankers that average 40,000 deadweight tons (dwt), that are specially modified to work with the vapor recovery system at the terminal and that will transport the crude oil mainly to Los Angeles area refineries.

On July 9, 1987, the county issued a Coastal Development Permit and Building Permit to Gaviota Terminal Company (GTC), a general partnership managed by Texaco Trading and Transportation, Inc. Onshore construction of the Gaviota Interim Marine Terminal began on July 10, 1987. Initial capacity of the terminal is expected to be about 43 Mbpd with expansion up to 100 Mbpd, if needed.

Santa Ynez Unit and Las Flores Canyon.--The Santa Ynez Unit is currently composed of 20 leases covering 97,437 acres that were acquired by Exxon and others in the 1968 Santa Barbara Channel lease sale. The first discovery in this area occurred in August 1968 on lease OCS-0197. Additional drilling has resulted in the discovery and delineation of four oil and gas fields within the unit. These are the Sacate, Pescado, Hondo, and Government Point fields. A DPP for the Santa Ynez Unit was approved by the U.S. Geological Survey (USGS) in 1974. Exxon subsequently installed Platform Hondo in June 1976; production from Hondo began on April 2, 1981. The first of a series of revised DPP's was submitted to the MMS in 1982. The revised DPP proposed (1) three or four additional offshore platforms to develop the three remaining unit fields, (2) consolidated processing facilities at Las Flores Canyon, (3) a consolidated marine terminal at Las Flores, (4) a consolidated storage facility in Corral Canyon, and (5) subsea and onshore pipelines to connect these components.

In 1984, the Santa Barbara County Board of Supervisors gave preliminary approval to all portions of Exxon's Preliminary Development Plan (PDP) for the onshore components of the project except for the

marine terminal. The County attached a condition to the project, however, requiring oil to be transported by pipeline out of the County. Exxon sued the County on this condition claiming the County lacked jurisdiction to impose this requirement. Exxon subsequently agreed to drop the lawsuit when the County gave final approval of their project. In October 1985, the County approved the use of the existing Texaco (formerly Getty) Gaviota Marine Terminal on an interim basis until pipeline transportation to Los Angeles and Texas was available, or until the Las Flores (Exxon) Marine Terminal was operational.

In December 1985, the Santa Barbara County Board of Supervisors and Exxon began meetings in an effort to resolve air quality disagreements on the project. Exxon revised the project by reducing the number of proposed offshore platforms from four to three and by dropping their plans to build a gas processing facility in Las Flores Canyon. By February 1986, Exxon had agreed to abandon using the offshore storage and treating (OS&T) vessel and process production onshore in exchange for renegotiating the conditions of its onshore permit.

On March 19, 1986, Exxon and the County reached a tentative agreement on the Santa Ynez Unit project. Exxon agreed (1) to build a 140-Mbpd processing plant in Las Flores Canyon, (2) to ship oil out by pipeline, and (3) to not expand the existing Pacific Offshore Pipeline Company plant from its current permitted capacity of 60-135 MMcfd. In return, the County agreed (1) that photochemical modeling for air quality would not be employed unless required, (2) that removal of the OS&T could be used as an emissions offset to the extent allowed by the Clean Air Act, (3) on a definition of net air-quality benefit, (4) on a reopener clause that would allow future review of the effectiveness of air-quality mitigation and allow for additional measures if reasonable and feasible, and (5) to defer the County versus Hodel lawsuit, which the County had filed against MMS for not imposing what the County considers to be feasible mitigation measures on Exxon's proposed offshore platforms. Finally, the two sides agreed (1) that the County could halt or slow onshore oil processing if the air quality worsens as a result of offshore oil production and (2) on steps that give the County a reopener clause after 3 years of monitoring nitrous oxide (NO_x).

Subsequent to negotiations between Santa Barbara County and Exxon, the Santa Barbara County Planning Commission approved Exxon's Final Develop-

ment Plan for the Santa Ynez Unit on September 15, 1987. The California Coastal Commission (CCC) reviewed the Final Development Plan and granted its concurrence to Exxon's consistency determination on February 23, 1988. After the review by various Federal and State agencies MMS approved Exxon's revised DPP for the Santa Ynez Unit on April 4, 1988. On April 8, 1988, Exxon began initial construction for the onshore components of its Santa Ynez Unit DPP in Las Flores Canyon.

Point Pedernales Unit and Lompoc. -- The Point Pedernales Unit is composed of six leases covering approximately 19,844 acres. After Unocal submitted a development application to Santa Barbara County in 1982 covering this unit, an areawide study was conducted to assess the cumulative effects of development in the Santa Maria Basin area. The areawide study included an analysis of cumulative impacts of Unocal's proposal and Exxon's proposed platform on adjacent lease OCS-P 0440.

Initial field development calls for production from Unocal's Platform Irene on lease OCS-P 0441. Production from Platform Irene is transported by a pipeline that has its landfall north of the Santa Ynez River at the Vandenberg Air Force Base. The pipeline then runs inland 6 miles to a new 36-Mbpd oil heating, separation, and pumping facility in Lompoc, and then on to two separate existing facilities for final processing of the oil and natural gas. The treated oil is sent to Unocal's Santa Maria refinery. Most of the crude oil is then sent to Unocal's Rodeo refinery in San Francisco for further processing. The natural gas is sent to Unocal's Battles gas processing plant near Santa Maria. From there the clean gas is sold and injected into a distribution network for local consumption. Unocal has agreed to limit throughput of OCS gas to 13 MMcfd at the Battles facility, which was constructed in 1937. If expanded capacity is needed, the plant will be reconstructed or moved elsewhere. Unocal agreed to electrify the platform and obtain this power from a Pacific Gas & Electric onshore substation located at Surf.

Exxon has a 100-percent interest in neighboring lease OCS-P 0440, where a discovery was made on October 8, 1983. Installation of Platform Independence on this lease is tentatively scheduled for 1992. Under a recent agreement between Exxon and Unocal, Unocal will operate the Platform Independence project. Plans call for production from Independence to use Platform Irene's pipelines to the treat-

ment facility at Lompoc. From Lompoc, the County approved the crude oil to be transported in Exxon's proposed Lompoc pipeline that parallels an existing southern California gas pipeline right-of-way to a Celeron pipeline interconnect. Because of the recent Unocal-Exxon agreement mentioned above, it is doubtful whether this pipeline will be built.

On August 7, 1985, Unocal launched the 72-slot Platform Irene jacket in 242 feet of water. This is the first platform to be set in the Lease Sale 53 area of the Santa Maria Basin. Unocal began construction on the Surf electrical substation 7 months later on March 20, 1986. On April 27, 1986, development drilling began on Platform Irene.

Unocal began transporting production from Platform Irene to Lompoc on April 13, 1987, at approximately 10 Mbpd. Problems with sour gas were encountered, but Unocal and the County of Santa Barbara devised minor project modifications to overcome these. Production quickly reached approximately 20 Mbpd of oil and 10 MMcfd of gas.

San Miguel and South Nipomo Mesa. -- The discovery of the San Miguel field resulted from exploratory drilling by Cities Service on Lease OCS-P 0409. In July 1987, Shell Western Exploration and Production, Inc., (SWEPI) became the designated operator and has subsequently purchased Cities Service's interest in this lease. The DPP proposed installation of the 72-slot Platform Julius in 478 feet of water, 9.5 miles west of Point Sal. It was proposed that some separation and treatment occur on the platform and that the gas be reinjected. SWEPI currently has no plans to sell commercial gas. The DPP identifies a need for three pipelines to shore: an oil pipeline, a produced water pipeline, and a service fuel pipeline. The operator's preferred location for the onshore oil separation and treatment facility is the South Nipomo Mesa area on Unocal land near the existing Unocal Santa Maria refinery. The DPP also calls for a 24-mile pipeline from the South Nipomo Mesa site to a Celeron pump station at Sisquoc in Santa Barbara County. This 24-mile segment is known as the Celeron Interconnect and lies primarily within Santa Barbara County.

The Joint Review Panel (JRP) established to guide preparation of the EIR/EIS for what is now Shell's project was chaired by San Luis Obispo County and consisted of three voting members (MMS, San Luis Obispo County, and the State Lands Commission

(SLC)) and three nonvoting members (Santa Barbara County, the CCC, and the Governor's Office of Off-shore Development).

On June 7, 1988, San Luis Obispo County voters rejected the San Miguel development project. Though the legal basis for "Measure A" and other similar local oil initiatives is being tested in court, SWEPI has been forced to postpone the San Miguel project preferred alternative.

Santa Clara Unit and Platform Gail. -- In 1973, the Santa Clara Unit was approved by MMS's predecessor, the Conservation Division of the USGS, and Chevron was designated the unit operator. Chevron is the designated lease operator for seven of the eight leases in this unit, all of which were acquired by the lessees in OCS Lease Sale P4. The Santa Clara Unit contains two known fields: the Santa Clara field and the Sockeye field. Two platforms currently are producing the Santa Clara field: Chevron operates Platform Grace on Lease OCS-P 0217 and Unocal operates Platform Gilda on Lease OCS-P 0216.

Chevron discovered the Sockeye field in 1970 on Lease OCS-P 0205. Chevron's DPP for this lease was deemed by the MMS on January 29, 1986. On November 14, 1986, MMS approved Chevron's DPP for development of the Sockeye field using Platform Gail located on Lease OCS-P 0205. Initial construction of this platform began on April 5, 1987. Chevron spudded its first development well from Platform Gail on June 16, 1988. Since that time Chevron has spudded several development wells; sustained production testing began in September 1988.

As a result of these projects, development well drilling in the Pacific OCS Region is likely to increase in the future as each of the proposed platforms listed in table 3-10, on the next page, is completed.

Chevron transports production from Platform Gail to Platform Grace by a new pipeline. Produced oil and natural gas will then accompany that of Platform Grace to Chevron's onshore separation and treatment and gas processing facilities at Carpinteria in southern Santa Barbara County. Treated oil will be transported to Chevron's El Segundo refinery in the Los Angeles area by pipeline. Cleaned sales gas will be sold to SoCal Gas Company and tied in to an existing SoCal line that crosses Chevron's Carpinteria facility.

**Table 3-10. Platforms proposed to be installed in the Pacific OCS Region
as of September 1988**

Platform	Operator	Origin of jacket fabrication	Origin of deck fabrication	Lease OCS-P	UNIT/(field)	Number of well slots	Water depth (ft)	Install date
Harmony	Exxon	Korea	Korea	0190	SANTA YNEZ/(Hondo)	60	1,200	1989
Heritage	Exxon	Korea	Korea	0182	SANTA YNEZ/(Pescado)	60	1,075	1989
Heather	Exxon	*	*	0193	SANTA YNEZ/(Sacate)	28	620	?
Julius	SWEPI	Korea		0409	(San Miguel)	70	478	?
Iris (1)	Unocal	*	*	0440	PT. PEDERNALES/ (Pt. Pedernales)	60	285	?

(1) Previous operator (Exxon) called it "Independence."

* Construction has not commenced.

Production Phase of Postlease Activities

As figure 3-17 indicates, annual production of crude oil and condensate from the United States OCS increased steadily from 1954 through 1971 when crude oil and condensate production reached its peak of 418.5 million barrels. Following nearly a decade of decline, OCS crude oil and condensate production began to increase in 1981 and then leveled out in 1985 and 1986 at approximately 389 million barrels per year.

It is important to note that the OCS contributes significantly to the total domestic crude oil and condensate production. As discussed in the introduction, the amount of crude oil the United States must import is on the rise (see fig. I-1, p. 2). As a result, the need for increased domestic production becomes more important. Figure 3-18 shows that the OCS contribution increased from 1954 to 1971 to a peak of 12.1 percent of all domestic crude oil and condensate production. Since 1971, the OCS contribution decreased for 9 years, as production decreased, and then in 1981 started a steady yearly increase, and peaked in 1986 at 12.3 percent. This yearly increase since 1981 resulted from both the increase in production off the coast of California, as well as a decrease in both onshore and State offshore production. The OCS contribution fell slightly in 1987 to 12.0 percent.

In 1987, the top 10 offshore operators produced over 75 percent of the total oil and condensate obtained from the OCS (see fig. 3-19). Shell Offshore, Inc. was the top producer of oil from the OCS in 1987, accounting for over 16 percent of the total.

As figure 3-20 on the next page indicates, natural gas production increased steadily since 1954, and reached its peak in 1981. Since 1981, natural gas production has fluctuated, with a 12.1 percent increase in 1987. Figure 3-21, on the next page, displays the percentage of the total domestic natural gas production that the Federal OCS contributed yearly. In 1987, this percentage reached an all time high, with Federal OCS natural gas production accounting for over 25 percent of the total domestic natural gas production.

Figure 3-22 on the next page displays the top 10 natural gas producers by percentage of the total Federal OCS natural gas production. As was the case for oil, Shell Offshore, Inc. was the top producer, accounting for over 10 percent of the total.

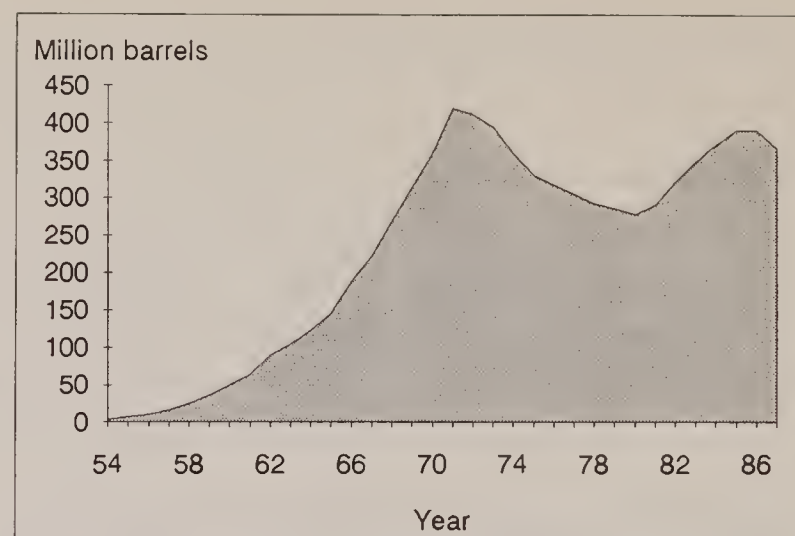
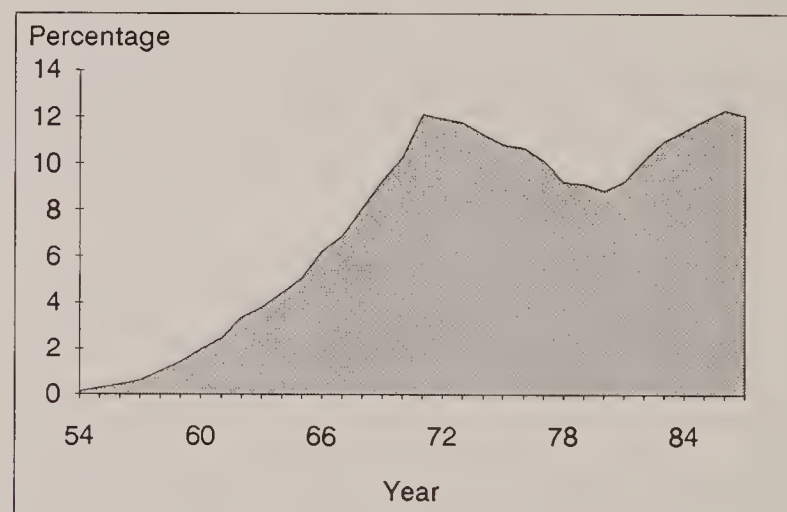


Figure 3-17. Federal offshore crude oil and condensate production through 1987.



Federal 3-18. Federal offshore crude oil and condensate production as a percentage of total U.S. production through 1987.

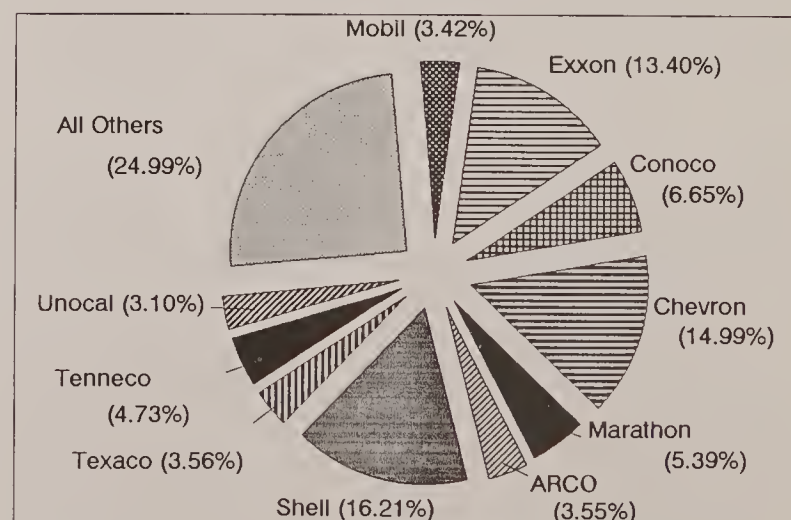


Figure 3-19. Top 10 producers by percentage of oil and condensate from the Federal OCS for 1987.

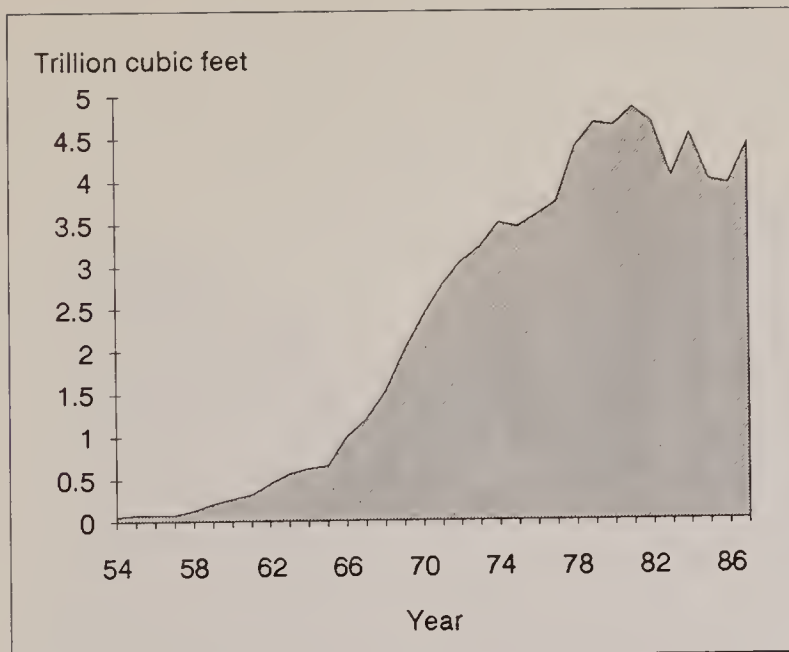


Figure 3-20. Federal offshore natural gas production through 1987.

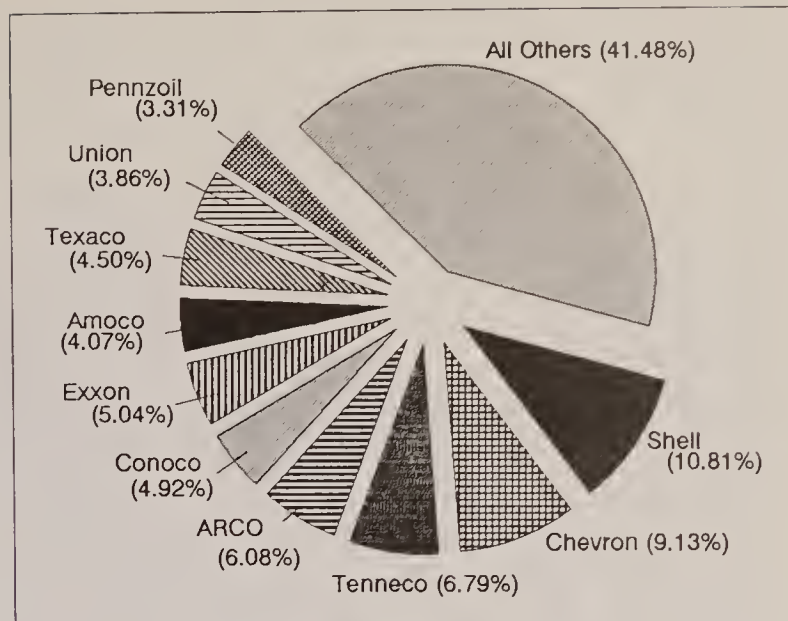


Figure 3-22. Top 10 producers by percentage of natural gas from the Offshore Federal OCS waters for 1987.

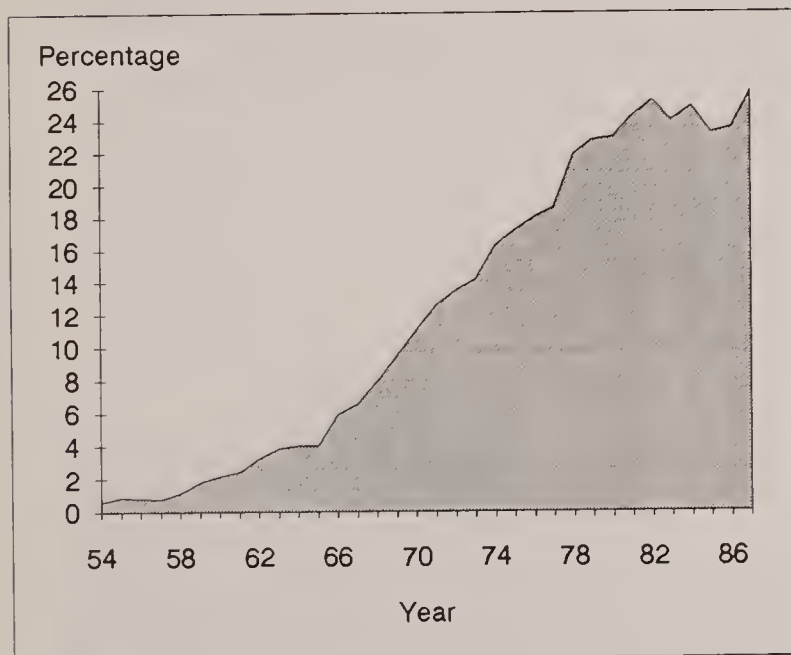


Figure 3-21. Federal offshore natural gas production as a percentage of total U.S. production through 1987.

GULF OF MEXICO OCS REGION

Production in the Gulf of Mexico OCS Region accounted for over 90 percent of the total Federal OCS production of oil, and over 99 percent of natural gas production in 1987. As figures 3-23 and 3-24 (see next page) show, the Gulf of Mexico OCS Region was the only producing region from 1954 to 1967. In 1968, the Pacific OCS Region began to contribute to OCS production, but the Gulf of Mexico OCS has continued to account for the majority of the OCS production.

Production from the Central Gulf of Mexico Planning Area accounts for the bulk of production in this region (see figs. 3-25 and 3-26 on page 97). As of December 31, 1987, the Central Gulf of Mexico Planning Area had produced over 7.3 billion barrels of oil and condensate and over 69.7 trillion cubic feet of natural gas. The Western Gulf of Mexico Planning Area had produced 176 million barrels of oil and condensate, and 9.1 trillion cubic feet of natural gas. No oil or natural gas has been produced from the Eastern Gulf of Mexico Planning Area.

As of December 31, 1987, there were 750 active fields in the Gulf of Mexico OCS Region. As shown on table 3-11 (p. 98), 666 of those fields were considered sufficiently developed to permit a reasonably accurate measure of reserves. Another 84 were not sufficiently developed to permit a reasonably accurate estimate of reserves; therefore, no estimates

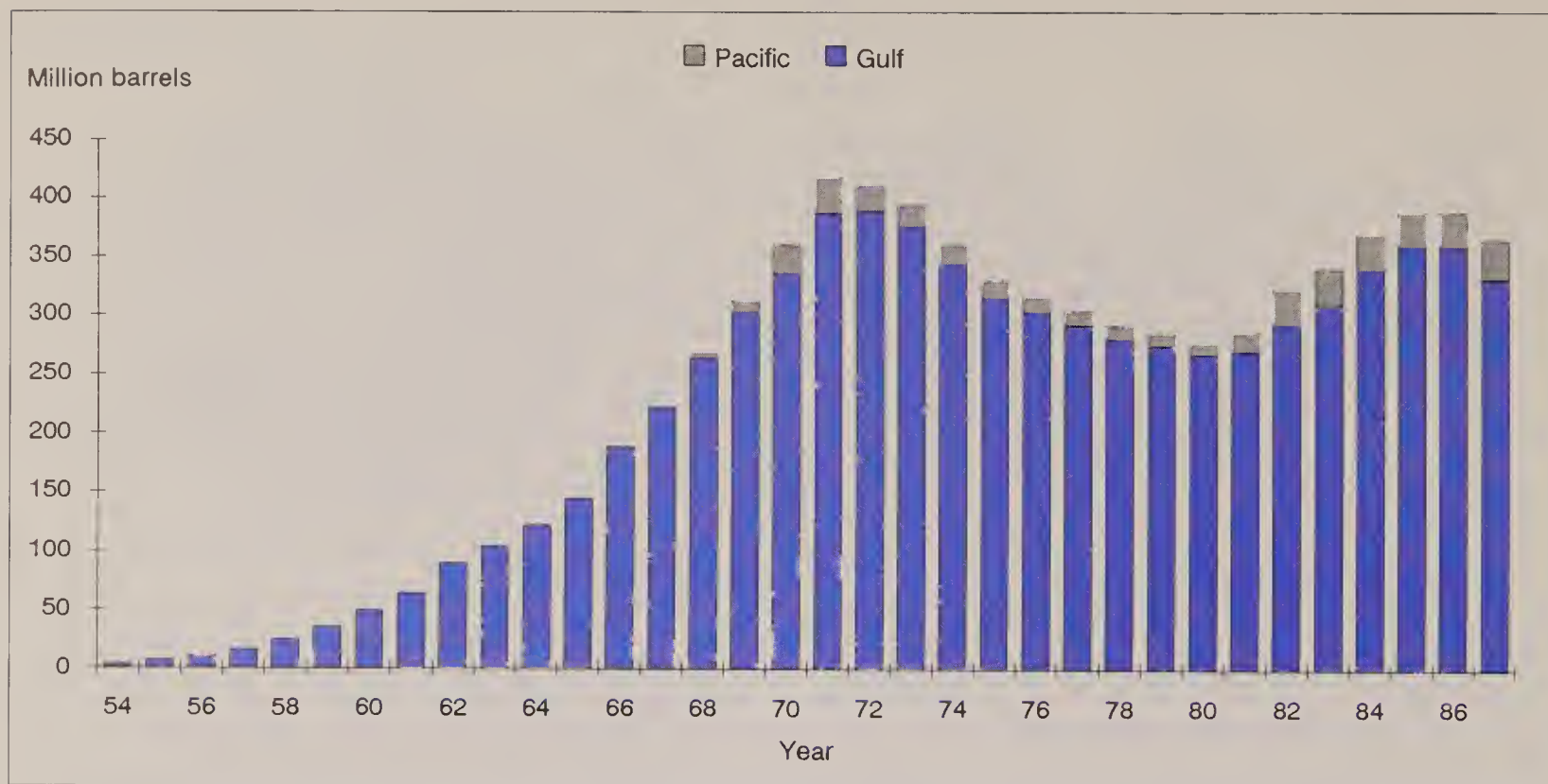


Figure 3-23. National OCS oil and condensate production from 1954 to 1987 and relative amounts produced in the Gulf of Mexico and the Pacific OCS Regions.

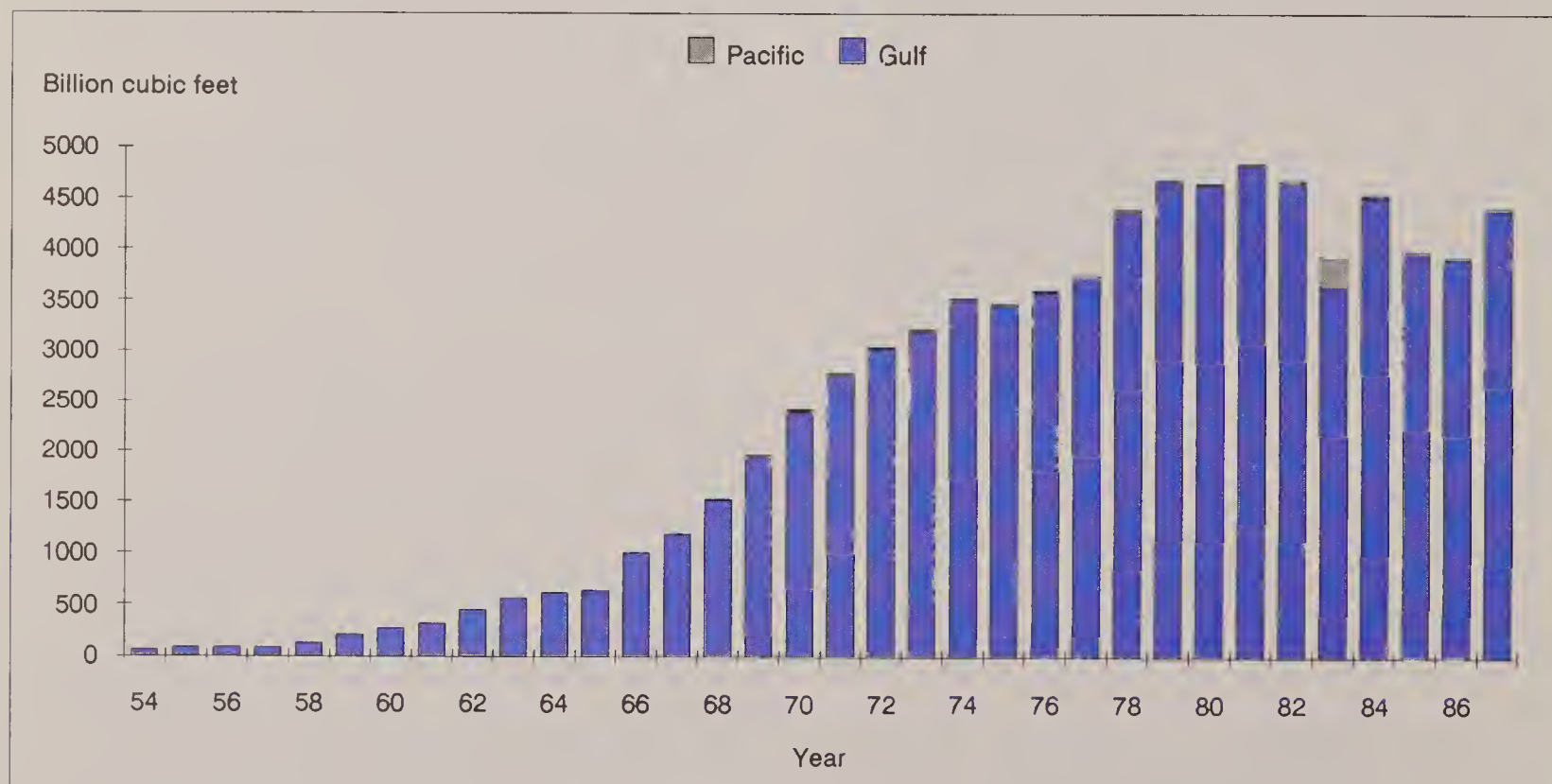


Figure 3-24. National OCS gas production from 1954 to 1987 and relative amounts produced from the Gulf of Mexico and the Pacific OCS Regions.

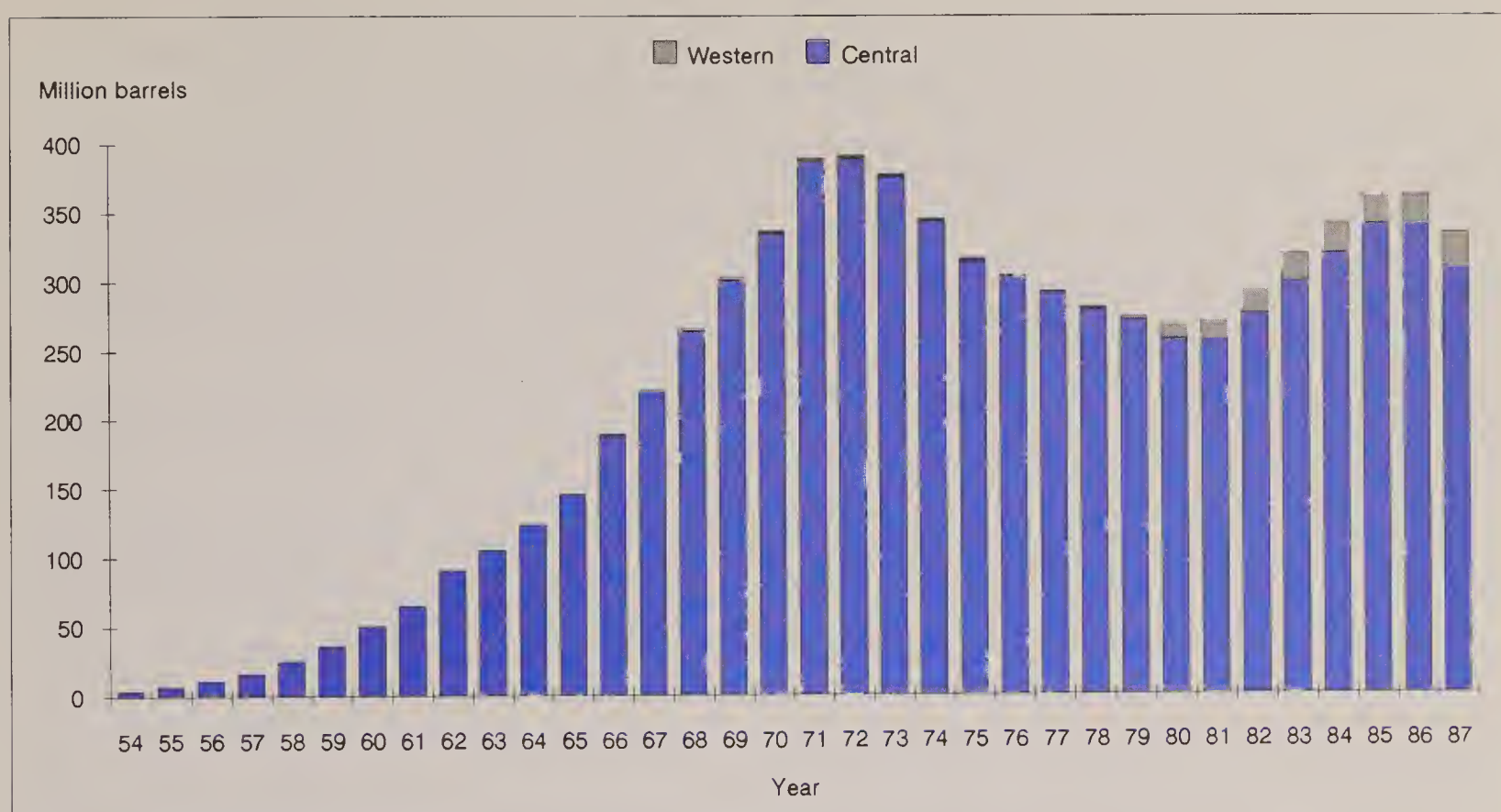


Figure 3-25. Crude oil and condensate production in the Gulf of Mexico OCS Region through 1987.

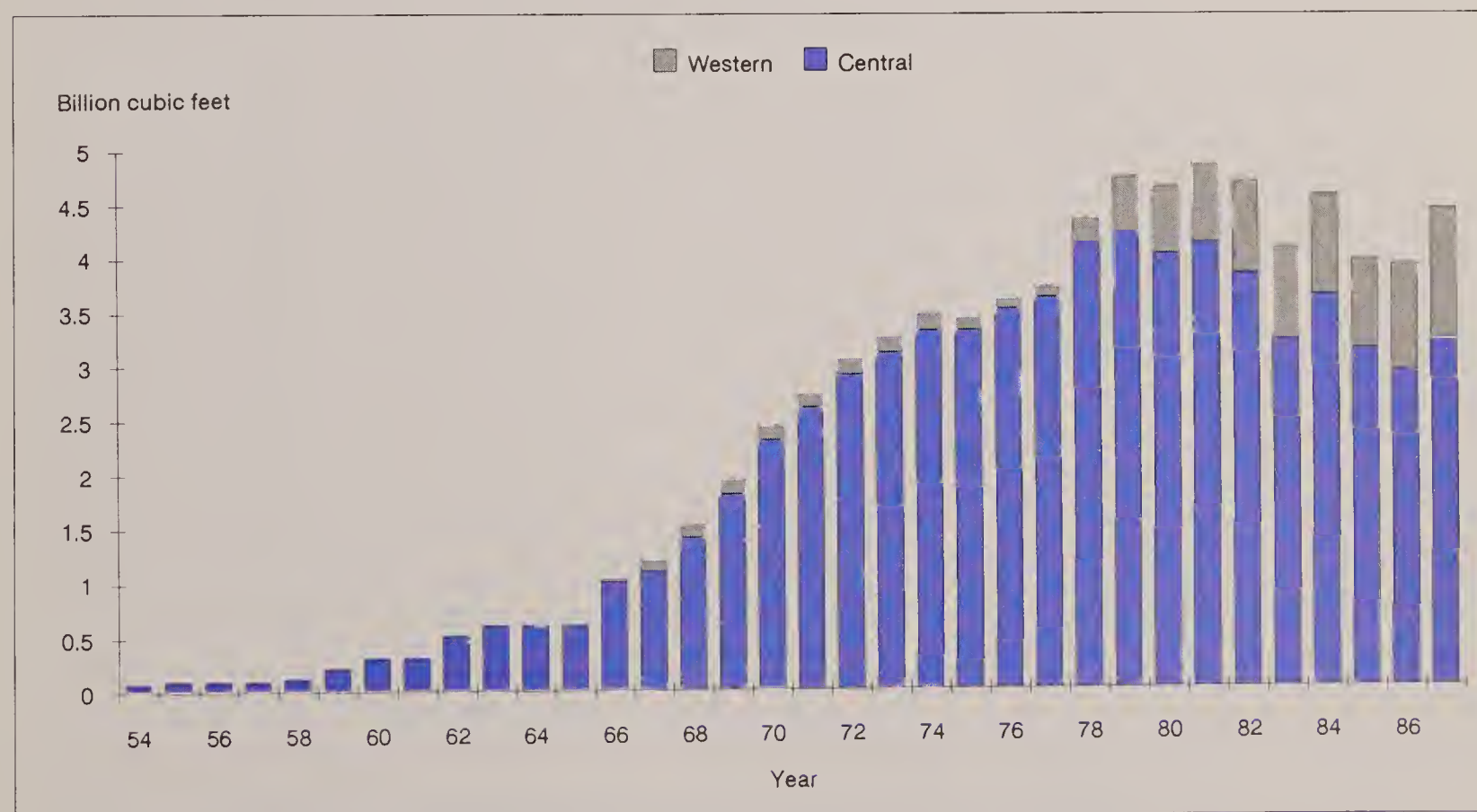


Figure 3-26. Natural gas production in the Gulf of Mexico OCS Region through 1987.

Table 3-11. Estimated demonstrated oil and gas reserves and cumulative production for the Gulf of Mexico OCS Region, December 31, 1987

[Demonstrated reserves: oil expressed in millions of barrels, gas in billions of cubic feet]

[Demonstrate recoverable oil expressed in millions of barrels, gas in billions of cubic feet]										
Area(s)	Number of fields				Original recoverable reserves		Cumulative production through 1987		Remaining recoverable reserves	
	Studied		Not studied	Active with production						
	Active	Depleted								
Western Planning Area										
Mustang Island & Padre Island	19	1	3	9	15	1,390	1	440	14	950
Matagorda Island	18	0	4	11	37	4,300	3	750	34	3,550
Brazos	18	3	3	16	10	2,300	4	1,000	6	1,300
Galveston	21	1	2	17	31	1,160	21	780	10	380
High Island & Sabine Pass	85	1	10	71	345	11,500	139	6,500	206	5,000
Western Slope*	9	0	5	5	51	781	5	14	46	767
Subtotal	170	6	27	129	489	21,431	173	9,484	316	11,947
Central Planning Area										
West Cameron & Sabine Pass	82	5	5	70	190	15,800	110	11,300	80	4,500
East Cameron	39	7	3	34	233	8,380	163	6,240	70	2,140
Vermilion	59	4	5	55	500	13,900	300	10,400	200	3,500
South Marsh Island	36	5	2	34	780	11,600	510	8,400	270	3,200
Eugene Island	58	3	1	54	1,510	15,100	950	10,500	560	4,600
Ship Shoal	50	3	4	45	1,250	10,400	860	7,400	390	3,000
South Timbalier	33	1	4	25	1,300	6,500	1,010	4,150	290	2,350
South Pelto	6	1	0	6	130	736	85	400	45	336
Grand Isle	13	2	0	11	910	3,900	740	3,000	170	900
West Delta	19	0	2	18	1,230	4,550	1,000	3,400	230	1,150
South Pass	11	0	1	8	920	2,720	630	1,750	290	970
Main Pass & Breton Sound	39	1	7	30	840	4,020	560	2,570	280	1,450
Viosca Knoll, Mobile, & Chandeleur	13	0	12	4	0	1,015	0	140	0	875
Central Slope**	38	0	11	7	480	2,050	170	565	310	1,485
Subtotal	496	32	57	401	10,273	100,671	7,088	70,215	3,185	30,456
Eastern Planning Area***										
Subtotal	0	0	0	0	0	0	0	0	0	0
Subtotal	666	38								
Total	704		84	530	10,762	122,102	7,261	79,699	3,501	42,403

* Western Slope includes Alaminos Canyon, Corpus Christi, East Breaks, Garden Banks, and Port Isabel.

** Central Slope includes Atwater Valley, Ewing Bank, Green Canyon, and Mississippi Canyon.

***Eastern Planning Area includes Charlotte Harbor, Destin Dome, Pensacola, Pulley Ridge, and others.

have been attempted. In addition to the 666 active fields, 38 depleted fields that were abandoned after production were included in the table in order to give a complete record of cumulative oil and gas production. As has been the case for decades, the Central Gulf of Mexico Planning Area has the majority of the region's fields, 96 percent of the oil reserves, and 84 percent of the gas reserves.

PACIFIC OCS REGION

Production in the Pacific OCS Region began in 1968 when Platform Hogan began producing oil from the Carpinteria Offshore field. As table 3-9 (p. 89) showed, 21 platforms have been installed in the Southern California Planning Area. As of December 31, 1987, production from these platforms has totaled over 402 million barrels of oil and over 283 billion cubic feet of natural gas. See table 3-12 below for more detailed information.

As shown in figure 3-27 on the next page annual production of crude oil in the Pacific OCS Region increased rapidly from 1968 to 1971 when production exceeded 31 MMbbl of oil per year. Production of oil then declined until 1980 when Platform Grace in the Santa Clara field and Platform Henry in the Carpinteria field began producing. In 1981, Pacific OCS crude oil production increased over 92 percent from 1980, as Platform Hondo (in the Santa Ynez Unit), Platform Gilda (in the Santa Clara Unit) and Platform Ellen (in the Beta Unit) were brought on line. (See sidebar titled "Unitization" on the next page for more information.) Annual production has continued to increase from that time to a record level of over 33.5 MMbbl in 1987.

Natural gas production on the Pacific OCS rose steadily from 1968 through 1971 and then went through a period of decline until it leveled off in 1975 (see fig. 3-28 on the next page). From 1975 through 1980, natural gas production on the Pacific OCS

Table 3-12. Pacific OCS Region's contribution to national production, 1968-1987

[Oil in barrels; gas in thousand cubic feet]

Year	Oil*				Natural gas				Year
	National OCS production	California OCS production	Percent of national	Percent production (+/-)**	National OCS production	California OCS production	Percent of national	Percent production (+/-)**	
1968 (1)	268,995,890	2,059,889	0.77		1,524,178,078	799,685	0.05		(1) 1968
1969 (2)	312,859,987	9,940,844	3.18	382.59	1,954,486,975	4,845,851	0.25	505.97	(2) 1969
1970 (3)	360,646,168	24,987,628	6.93	151.36	2,418,676,591	12,229,147	0.51	152.36	(3) 1970
1971	418,548,946	31,103,548	7.43	24.48	2,777,043,418	15,671,479	0.56	28.15	1971
1972	411,885,893	22,562,213	5.48	-27.46	3,038,554,773	10,033,581	0.33	-35.98	1972
1973	394,729,999	18,915,314	4.79	-16.16	3,211,588,422	7,286,549	0.23	-27.38	1973
1974	360,594,065	16,776,744	4.65	-11.31	3,514,723,907	5,573,642	0.16	-23.51	1974
1975	330,237,452	15,304,757	4.63	-8.77	3,458,693,454	3,951,633	0.11	-29.10	1975
1976	316,920,109	13,978,553	4.41	-8.67	3,595,923,526	3,475,201	0.10	-12.06	1976
1977 (4)	303,948,240	12,267,598	4.04	-12.24	3,737,746,922	3,289,963	0.09	-5.33	(4) 1977
1978	292,265,042	12,085,908	4.14	-1.48	4,385,060,878	3,472,292	0.08	5.54	1978
1979	285,565,538	10,961,076	3.84	-9.31	4,672,979,139	2,866,822	0.06	-17.44	1979
1980 (5)	277,388,975	10,198,886	3.68	-6.95	4,641,456,983	3,107,023	0.07	8.38	(5) 1980
1981 (6)	289,765,405	19,605,027	6.77	92.23	4,849,536,728	12,766,307	0.26	310.89	(6) 1981
1982 (7)	321,211,457	28,434,202	8.85	45.04	4,679,511,272	17,750,924	0.38	39.05	(7) 1982
1983 (8)	348,331,243	30,527,487	8.76	7.36	4,040,733,857	16,024,292	0.40	-9.73	(8) 1983
1984 (9)	370,239,014	30,254,306	8.17	-0.89	4,537,841,051	27,806,899	0.61	73.53	(9) 1984
1985 (10)	386,324,285	29,781,465	7.71	-1.56	4,000,975,226	49,164,213	1.23	76.81	(10) 1985
1986	389,216,002	29,227,846	7.51	-1.86	3,948,895,001	42,689,021	1.08	-13.17	1986
1987	366,141,709	33,556,686	9.16	14.81	4,425,581,690	40,986,158	0.93	-3.99	1987
Totals	6,805,815,419	402,529,977	5.91		73,414,187,891	283,790,682	0.39		

(1) Initial production: Platform Hogan

(2) Initial production: Platforms Houchin and A

(3) Initial production: Platforms Hillhouse and B

(4) Initial production: Platform C

(5) Initial production: Platforms Henry and Grace

* Combines oil and condensate.

** Increase or decrease from previous year.

(6) Initial production: Platforms Hondo and Ellen

(7) Initial production: Platform Gilda

(8) Initial production: Platforms Gina and Habitat

(9) Initial production: Platform Edith

(10) Initial production: Platform Eureka

Note: These production figures represent "sales" production, not total volumes produced.

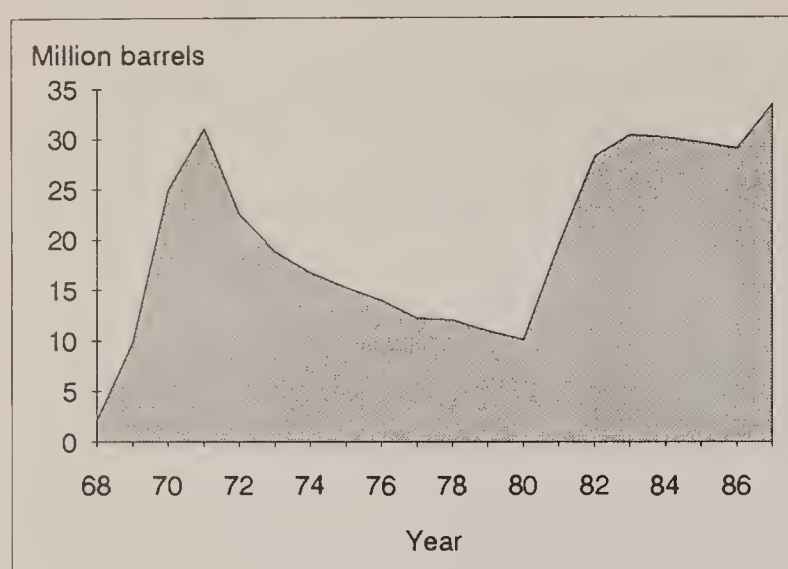


Figure 3-27. Crude oil production in the Pacific OCS Region, 1968-1987.

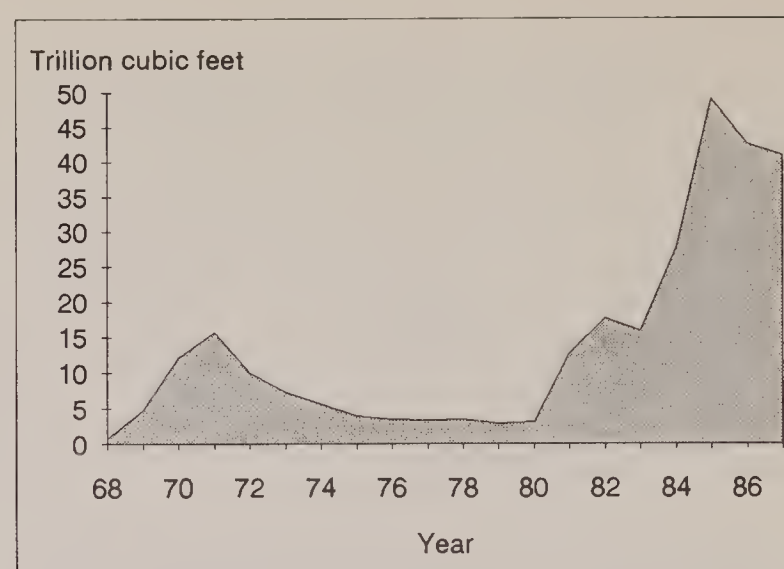


Figure 3-28. Natural gas production in the Pacific OCS Region, 1968-1987.

remained fairly constant at approximately 3.5 trillion cubic feet per year. As a result of production from Hondo and Santa Clara fields, production increased over 310 percent from 1980 to 1981, and then, following a slight decrease in 1983, natural gas production in the Pacific increased to a record level of 49.1 million cubic feet in 1985. This increase was due, in part, to initial production from Platforms Edith and Eureka in the Beta Unit. Since 1985, natural gas production has been on the decline.

Table 3-13 on the next page lists the original reserves, cumulative production, and the remaining reserves for the 24 fields that MMS identified as producible in the Pacific OCS Region as of December 31, 1987. (For an indepth discussion of the estimates and these fields, refer to OCS Report MMS 88-0047. Figure 3-29, p. 102, displays the locations of these fields.)

Unitization

Unitization is the practice of pooling all interests, ownership, and control in a producing field or part of a field to ensure conservation of natural resources and to protect correlative rights in the national interest. A "unit agreement" provides for a single operator or company to develop and operate several leases as if they were one. The purpose of the agreement is to maximize oil and gas recovery from reservoirs with multiple owners, while eliminating the drilling of unnecessary wells, reducing development and production costs, and ensuring the orderly development of petroleum resources as well as the equitable distribution of revenues to all owners of correlative rights.

As part of its supervisory role in the OCS production process, MMS encourages voluntary unitization. When operators fail to enter into unit agreements voluntarily, MMS may initiate the formation of units where it is deemed necessary for conservation and protection of public resources. Once a unit has been formed, an operator of a lease within the unit can request a suspension of operations from MMS. If a suspension is granted, the term of the lease can be extended beyond its primary term for a period of time specified by the suspension agreement.

Table 3-13. *Estimated demonstrated oil and gas reserves and cumulative production for the Pacific OCS Region, 1981-1987*

[Oil in million barrels; gas in billion cubic feet]							
Federal data	1981	1982	1983	1984	1985	1986	1987
Number of fields	13	14	20	23	24	24	24
Original reserves(1)							
Oil(2)	1,082	1,217	1,433	1,515	1,599	1,670	1,727
Gas(2)	1,847	1,983	2,298	2,400	2,334	2,461	2,501
Annual production							
Oil	20	29	31	31	30	29	31
Gas	13	18	24	46	65	58	55
Cumulative production							
Oil	221	249	280	310	340	369	400
Gas	114	132	156	202	267	323	378
Remaining reserves(1)							
Oil	861	968	1,153	1,205	1,259	1,302	1,328
Gas	1,733	1,851	2,141	2,198	2,067	2,135	2,123

(1) Changes in reserve estimates from year to year are due, in part, to modifications to the initial estimation.

(2) Oil includes crude oil, condensate, and gasplant products sold. Gas includes both associated and nonassociated dry gas.

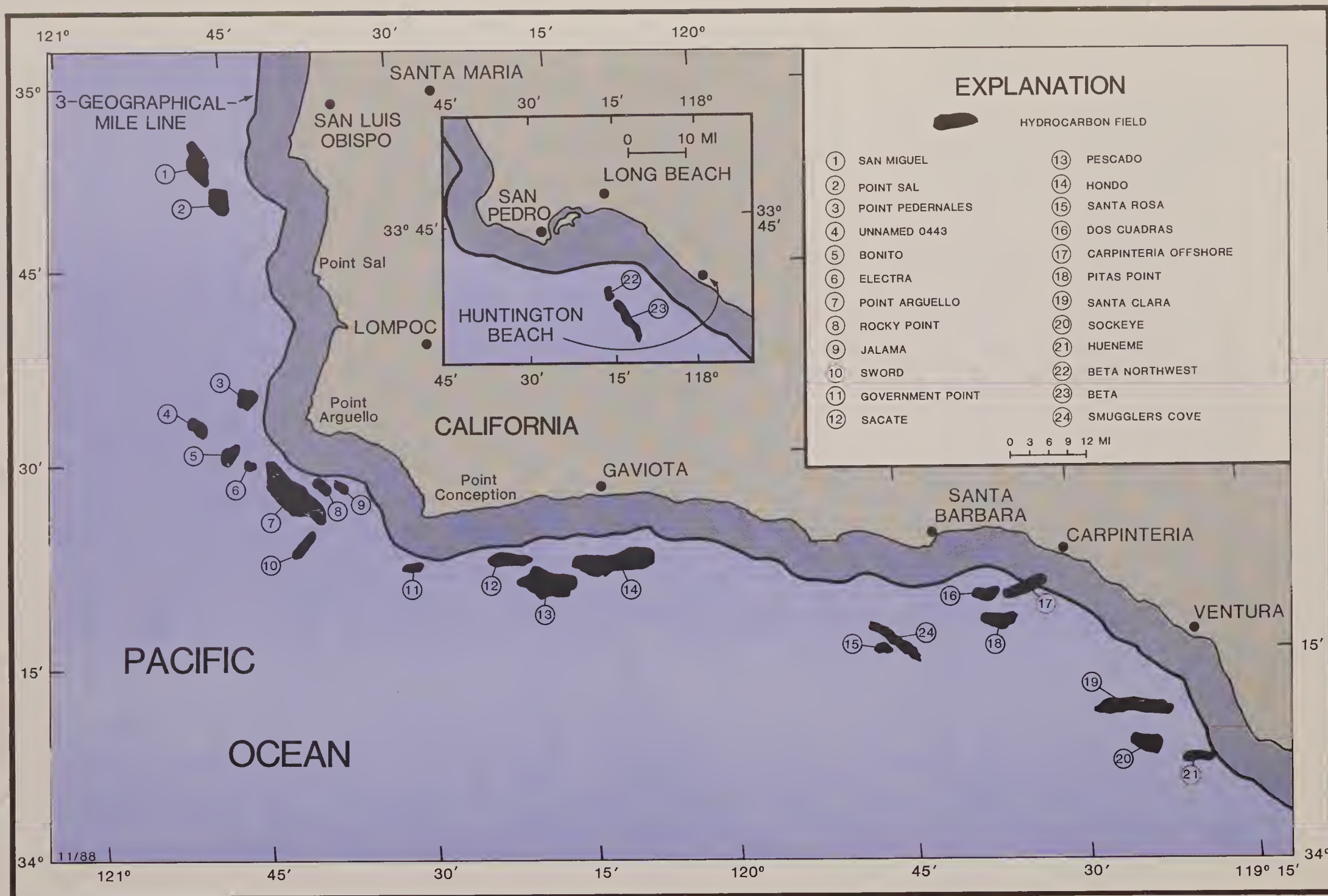


Figure 3-29. Recognized discoveries of federally controlled oil and gas fields in the Pacific OCS Region.

4. Oil and Gas Transportation and Onshore Support Facilities

Oil and Gas Transportation

Offshore oil and gas can be transported to shore via pipelines, barges, or tankers. The choice between these different modes of transportation depends on a number of factors, including size and composition of the offshore field, the field's distance from shore, weather and oceanographic conditions, proximity to refineries and processing plants, and whether or not onshore pipelines exist to transport the product to a processing facility. These factors may be compounded by permitting problems, which can strongly influence onshore facilities.

Most of the oil and gas produced offshore undergoes preliminary separation, treatment, and metering at the platform, and is then transported to shore for final processing and refining. The majority of OCS hydrocarbons are transported to shore via pipeline; the balance is carried on barges or tankers.

A number of agencies have varying degrees of authority in approving transportation plans for routing pipelines. The MMS is responsible for (1) issuing pipeline permits, (2) approving pipeline rights-of-way for transport of oil and gas through waters under Federal jurisdiction, and (3) inspecting and monitoring pipelines. Agencies involved in approval or review of these pipelines include the U.S. Army Corps of Engineers, the Federal Energy Regulatory Commission, the Interstate Commerce Commission, and the Department of Transportation's Office of Pipeline Safety. In State waters, pipeline right-of-ways and permitting for site locations of coastal-dependent, energy-related facilities such as pipeline landfalls, marine terminals, and service support bases are the responsibility of the respective State authorities.

PORT ACCESS ROUTE STUDIES

The U.S. Coast Guard (USCG) regularly conducts Port Access Route Studies (PARS). The studies examine potential vessel traffic density in, and the safety of, existing or proposed access routes in traffic separation schemes (TSS), in fairways, or in precau-

tionary areas adjoining major ports. Implementing the findings of these studies affect the manner in which specific OCS areas are leased and subsequently explored or developed. These studies are conducted in all of the OCS regions. Some examples are provided below.

On December 13, 1985, the USCG announced the results of their PARS that focused on the approaches to the Port of New York (50 FR 50925). This study examined the potential competition between oil and gas activities and other vessel traffic within the offshore area between two existing TSS's in the approach to this port. The USCG concluded that leasing and subsequent development of tracts in the area of the proposed fairways would interfere with the safe transit of vessels to and from the Port of New York. As a result of this study, the USCG has proposed to establish two 2-mile-wide parallel fairways to connect the existing TSS's. The proposed fairways would run generally in an east-west direction and, at their termini, would funnel to a width of 5 miles to match the dimensions of each TSS.

Two port access route studies were conducted by the USCG in the Gulf of Mexico OCS Region. The first study is for the approach to Freeport, Texas (52 FR 25039). The intent of this study was to determine if a modification to the existing fairway anchorages is necessary. The second port access route study resulted in a proposed rule that would eliminate the Southern Tampa fairway anchorage area and would establish a new fairway anchorage area in the approach to Tampa Bay, Florida (52 FR 28019). The new fairway anchorage area is intended to increase navigation safety by providing an anchorage area contiguous to and associated with the Tampa Shipping Safety Fairway. This action would permit deep-draft vessels to anchor safely in the approach to Tampa Bay.

Regional overviews of OCS transportation are provided below. Although there is no production in the Alaska and Atlantic regions, a number of transportation plans have been developed for these regions.

REGIONAL TRANSPORTATION OVERVIEWS

Alaska OCS Region

When the OCS Oil and Gas Leasing Program began in Alaska during the 1970's, transportation strategies and issues were studied carefully to assess the impacts of various scenarios. The Alaska environment creates many challenges for planners and engineers, such as ice floes, permafrost, earthquakes, and volcanos. Hydrocarbon transportation systems were studied to address each of these unique environmental considerations. These studies and discussions led to proposals for the transportation of Alaska OCS oil and gas from offshore wellheads to shoreside transshipment facilities and from those facilities to major refineries and markets.

A major component of MMS's research and planning activities in the region has been the Alaska OCS Socioeconomic Studies Program (SESP). The multiyear SESP research effort is assessing and evaluating the effects of OCS development upon the physical, social, and economic environments within the State of Alaska.

Many other studies of possible transportation scenarios for Alaska OCS hydrocarbons have been conducted, as have many studies that have produced related findings. Examples of such studies would include reports of the National Petroleum Council's Transportation Task Group on east-west pipelines to connect Bering Sea coastal landfalls into the Alyeska pipeline and the voyage of the Exxon icebreaking tanker *Manhattan* across the northwest passage to the Atlantic Ocean. For more information on Studies related to Alaska OCS transportation, see the Additional Readings section at the end of this chapter.

Although no development has occurred to date on the Alaska OCS, the studies conducted on a wide variety of possible transportation systems have defined probable scenarios for each planning area. Table 4-1 on the next page provides an overview of the various Alaska OCS oil and gas transportation strategies. In each case, hydrocarbons are transported to a transshipment facility on an Aleutian island, on the southern coast of the Alaska Peninsula, or along the shore of the Gulf of Alaska. From this facility in an ice-free port, oil would be loaded onto very large crude carriers (VLCC's) or other large tankers for shipment to continental U.S. refineries and marketing centers. The operation would be similar in this stage to the Alyeska transshipment facility activities in Valdez--loading oil from the Trans-Alaska Pipeline onto U.S. tankers headed for the coterminous States.

In all the scenarios except for that of Navarin Basin hydrocarbons, pipelines from offshore production platforms to onshore facilities are considered the preferred method for transportation to shore. The Federal Government has made this preference clear in stipulations attached to OCS leases in the Beaufort Sea, Norton Basin, St. George Basin, Cook Inlet, and Gulf of Alaska Planning Areas (see the Transportation sidebar below).

The distance of the Navarin Basin from any landfalls precludes the economic benefit of pipelines to shore.

Transportation of Hydrocarbon Products Stipulation for Alaska OCS Leases

The following stipulation stating the Federal Government's preference for pipeline transportation of hydrocarbons from OCS wellhead to shore has been attached to leases in the Beaufort Sea, Norton Basin, St. George Basin, Cook Inlet, and Gulf of Alaska Planning Areas. It does not apply to leases in the Navarin Basin. The stipulation reads as follows:

Pipelines will be required: (a) if pipeline rights-of-way can be determined and obtained; (b) if laying such pipelines is technologically feasible and environmentally preferable; and (c) if, in the opinion of the lessor, pipelines can be laid without net social loss, taking into account any incremental costs of pipelines over alternative methods of transportation and any incremental benefits in the form of increased environmental protection of reduced multiple use conflicts. The lessor specifically reserves the right to require that any pipeline used for transporting production to shore be placed in certain designated management areas. In selecting the means of transportation, consideration will be given to any recommendation of the Regional Technical Working Group for assessment and management of transportation of OCS oil and gas with participation of Federal, State, and local governments and the industry.

All pipelines, including both flow lines and gathering lines for oil and gas, shall be designed and constructed to provide for adequate protection from water currents, storms, and ice scouring, permafrost, subfreezing conditions, and other hazards as determined on a case-by-case basis.

Following the development of sufficient pipeline capacity, no crude oil production will be transported by surface vessel from offshore production sites, except in the case of emergency. Determinations as to emergency conditions and appropriate responses to these conditions and appropriate responses to these conditions will be made by the Regional Supervisor, Field Operations.

Where the three criteria set forth in the first sentence of this stipulation are not met and surface transportation must be employed, all vessels used for carrying hydrocarbons to shore from the leased area will conform with all standards established for such vessels, pursuant to the Ports and Waterways Safety Act of 1972 as amended (33 U.S.C. 1221 et seq.)(49 FR 2973).

Table 4-1. *Transportation scenarios for hydrocarbons produced from Alaska OCS planning areas*

<i>Planning area</i>	<i>Transportation scenario</i>
Beaufort Sea	Marine pipelines to landfall, onshore pipeline to connection with Trans-Alaska Pipeline or natural gas pipeline system for transport to transshipment facility on coast of the Gulf of Alaska.
Norton Basin	Marine pipeline to onshore storage and loading facility, icebreaking shuttle tankers to transshipment facility on south side of the Alaska Peninsula or Aleutian Islands.
St. George Basin	Marine pipeline to an onshore transshipment facility on one of the Pribilof Islands (for production sites in northern sector of basin). Marine pipeline to landfall, onshore pipeline to transshipment facility on south side of an Aleutian Island.
Navarin Basin	Marine pipeline to adjacent offshore loading facility, icebreaking shuttle tankers to transshipment facility on a Pribilof or Aleutian Island.
Cook Inlet	Marine pipeline to onshore transshipment facility on coast of Cook Inlet or Gulf of Alaska.
Gulf of Alaska	Marine pipeline to onshore transshipment facility on coast of the Gulf of Alaska.
North Aleutian Basin	Marine pipeline to landfall, onshore pipeline to transshipment facility on south side of an Aleutian Island.
Chukchi Sea	Marine pipeline to landfall near Point Belcher, onshore pipeline to connect with Trans-Alaska Pipeline at Pump Station 2.

In a Navarin Basin production scenario, however, wellheads and transshipment facilities to tankers would be so distant from onshore locations that risks to coastal zone environments would be minimized. Therefore, the transportation scenario for the Navarin Basin would include using tankers to transport the hydrocarbons to shore.

Atlantic OCS Region

Transportation issues were examined in each of the three planning areas. The EIS's generated for each lease sale within these areas recognize a number of conceivable gas pipeline corridors and oil tanker routes. However, because no commercially producible quantities of oil and gas have been discovered, no specific pipeline or tanker routes in the Atlantic OCS have been identified to date. These hypothetical transportation scenarios are made on the basis of the proximity of potential hydrocarbon discoveries to existing refineries or processing facilities and are developed in consultation with State governments.

Transportation management plans developed under the auspices of the Regional Technical Working Group's (RTWG's) in the Mid- and South Atlantic Planning Areas have been prepared and are discussed below.

The first version of the Hudson Canyon Transportation Management Plan (HCTMP) was completed and published in June 1981. It was prepared by the Bureau of Land Management's New York OCS Office with advice and endorsement from the Mid-Atlantic RTWG. The report was initiated because of gas discoveries on adjacent Lease Sale 40 Blocks 598, 599, and 642; these were later determined to be non-commercial. With the possibility of a gas pipeline originating from these blocks, the HCTMP focuses on the offshore environment from the area of the blocks to the New Jersey coastline from Sandy Hook to Cape May. The report identifies constraints that may affect the siting of a pipeline within the study area. Five small areas were identified as having constraints that should be avoided in pipeline siting: a geologic slump area, a mud-dump site, two explosive dump sites, and an anchorage ground off Sandy Hook, New Jersey. The rest of the offshore area may be suitable for a gas pipeline if appropriate engineering and pipeline design techniques, as identified in the report, are used. The report identifies areas where other offshore activities occur that also must be accommodated. These areas include vessel traffic locations, military-use areas, underwater cable locations, and fishery areas. The HCTMP contains maps depicting these constraint areas, and it presents

nine specific recommendations concerning pipeline siting and design. In addition, Federal and State legal requirements are also discussed.

The HCTMP is intended to provide information necessary to make decisions on whether to accept or reject a pipeline proposal. The report also contains information concerning mitigation techniques that should be used when pipeline routes are proposed. Specific pipeline routes, however, are not identified.

The South Atlantic Regional Transportation Management Plan (RTMP) was published in June 1981. The study area extended from approximately the North Carolina-Virginia boundary south to Cape Canaveral, Florida. The RTMP is principally an integration of regulatory frameworks, policies, and plans that are applicable to pipeline siting from each of the South Atlantic Coast States. The regulatory framework of the Federal agencies involved in the South Atlantic OCS jurisdictional area is also incorporated into the RTMP. The plan identifies three levels of working plans, which are distinguished by their degree of detail in relation to OCS actions. The three levels are as follows:

Level I -- Broad, macro-level planning to inventory existing values and constraints, used in areas having no leased blocks, but with blocks on a tentative block list;

Level II -- Refinement in detail of Level I plan to identify high-risk or sensitive areas, used in areas having leased blocks, but with no marketable discoveries; and

Level III -- Detailed planning of coastal zone and Federal waters and classification of areas into one of three management classes, used in specific zones shoreward from marketable discoveries.

The RTMP incorporates the first two planning levels, which coincides with the degree of South Atlantic OCS activities to date. The States of North Carolina and South Carolina have completed Level I planning efforts. The States of Georgia and Florida and the Federal agencies involved in OCS transportation planning have completed the Level II planning stage. The RTMP also identifies important coastal and nearshore areas. Many of these areas (e.g., parks and wildlife refuges) are important because they relate to State policies and plans.

In the North Atlantic Planning Area, two States have taken the lead in transportation planning for the OCS. The Massachusetts Coastal Zone Management Program conducted a preliminary pipeline siting study for natural gas originating from the OCS. The study focused on the types of data necessary in the identification of natural gas pipeline corridors, including physical, geological, and biological features and existing land-use patterns. The study resulted in preliminary identification of potential pipeline corridors.

The Rhode Island Office of Statewide Planning conducted an energy facilities siting study that considered petroleum storage facilities, refineries, power plants, and pipeline corridors. The study provided a comprehensive review of legal, environmental, and socioeconomic factors important to the siting process. A case study was presented in which a computer model was applied to a hypothetical pipeline landfall in Little Compton, Rhode Island.

Many other Atlantic Coast States have prepared studies addressing transportation of OCS resources. A number of these were funded with grants from the Federal Coastal Energy Impact Program.

Gulf of Mexico OCS Region

In addition to the large amounts of crude oil and natural gas produced in the Gulf of Mexico OCS, the Gulf coast receives transshipments of Alaskan and California crude oil, as well as a large part of the crude oil imported into the country. These factors have resulted in a highly developed hydrocarbon transportation system, both pipeline and tanker, in the Gulf region. Including both State and Federal waters, the Gulf of Mexico contains the most extensive offshore pipeline network in the world. Approximately 64 percent of all Gulf of Mexico OCS pipelines are located in the Central Gulf of Mexico Planning Area. The remaining 36 percent are in the Western Gulf of Mexico Planning Area. Currently, there are no pipelines projects in the Eastern Gulf of Mexico. Figure 4-1 on the next page shows the number of pipeline projects approved by MMS and the total mileage for the period 1983-1988.

Each year, hundreds of miles of pipelines are added to the already extensive pipeline network in the Gulf of Mexico. For the most part, the additions are sections of small-diameter gathering flowlines, linking new platforms to a major pipeline system or adding

to the capacity of the system by running a new line parallel to the existing trunkline.

A number of major gas pipeline systems have been constructed in the Western Gulf of Mexico OCS, including the Central Texas Gathering System (CTGS) and the High Island Offshore System (HIOS). The CTGS carries dedicated gas reserves from Brazos, Galveston, Matagorda Island, and Mustang Island offshore areas to a processing plant at Markham, Texas, west of Freeport. The HIOS is composed of 203 miles of main trunk pipeline servicing the High Island and adjoining leased areas. Producers build lateral pipelines that connect with this system to transport their gas. The HIOS gas is transported ashore near the Texas-Louisiana border for final processing.

Vessel transportation is used infrequently to carry ashore crude oil and condensate produced on the Gulf OCS. However, tankers do carry a significant amount of crude oil to Gulf ports from Alaska, California, and overseas. With its abundant refineries and onshore pipeline networks, the Gulf of Mexico OCS Region has become a major center for handling imported oil.

The anticipated increase in demand for imported crude oil in the mid-1970's, following the Arab oil embargo, produced numerous proposals to develop centralized, high-volume facilities in the Gulf of Mexico OCS Region. These proposals included the dredging of existing channels and ports and the construction of deep-water ports or transshipment terminals to accommodate the supertankers being built to transport the anticipated quantities of oil. However, this increased demand has not materialized, and only one deep-water port, the Louisiana Offshore Oil Port (LOOP), was built.

The LOOP facility is located about 19 miles off the Louisiana coast, south of New Orleans, in 110 feet of water. It consists of a pump platform, a control platform, and three single-anchor leg mooring buoys. Crude oil is pumped from the tanker's cargo hold to LOOP's pumping platform in flexible, floating hoses and then to shore in a 48-inch submarine pipeline. The pipeline continues 28 miles inland to the Clovelly Salt Dome Storage Terminal for temporary storage.

The LOOP design capacity is 1.4 MMbpd. Since beginning operations in May 1981, the facility has been operating far below this capacity.

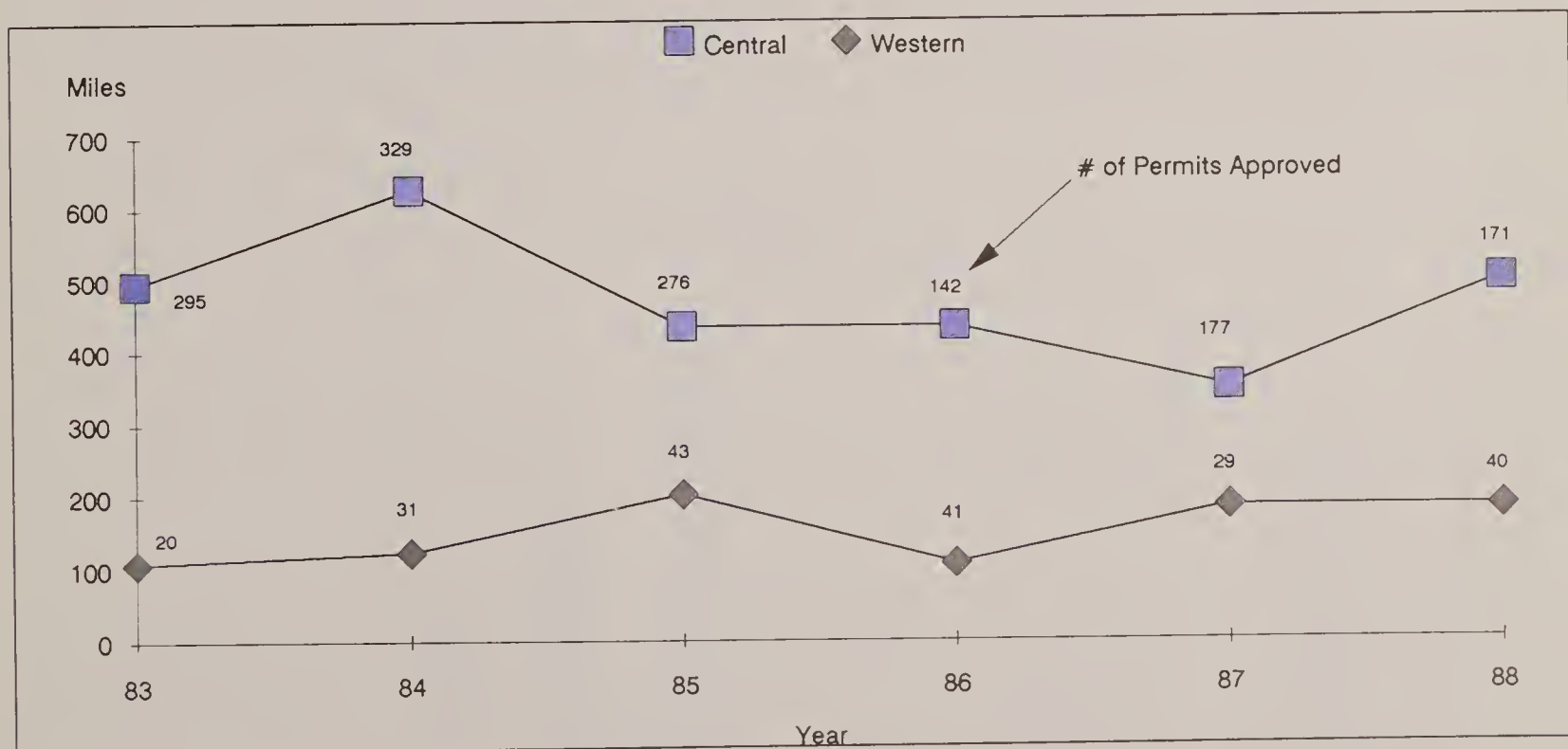


Figure 4-1. Pipeline projects approved by MMS and total mileage, 1983 through September 1988.

Pacific OCS Region

The majority of Pacific OCS reserves to date are located off of Santa Barbara County; development fields in the Santa Barbara Channel and Santa Maria Basin are located primarily off the County's shores.

The State of California addressed hydrocarbon transportation through the California Coastal Oil Pipeline Planning Act of 1980, which identifies pipelines as the preferred mode of transport. Santa Barbara County also adopted this policy. The Oil Transportation Plan and Environmental Impact Report (collectively referred to as the OTP and prepared by the Energy Division of the Resource Management Department of Santa Barbara County in 1984) addressed the cumulative impact of the offshore oil and gas development and advocated the use, where possible, of consolidated onshore facilities. Although the Federal Government regulates oil and gas development on the OCS, efficient, large-scale industry activity requires nearby shore-based support and transportation facilities. Thus, development of OCS resources in much of the Pacific OCS Region required de facto approval by Santa Barbara County.

Pipeline construction on the Pacific OCS, though sporadic, can be associated with various development projects. Figure 4-2 below presents information on the offshore pipeline construction in Federal OCS

waters in the Pacific OCS Region from 1967 to 1988. The peak in 1968 can be linked to development of the Dos Cuadras field. The increase in construction in 1979 and 1981 can be attributed to development of the Santa Clara Unit and some Beta Unit development. Construction in 1983 was a result of pipeline placed from Platform Habitat and the Pitas Point Unit to shore. Some Beta Unit tie-ins between Platform Edith and Platforms Elly and Eva and between Hondo and shore accounted for additional 1983 construction. Table 4-2 on the next page displays data on existing and proposed offshore pipelines in Federal waters. The pending development and production projects discussed in chapter 5 will add a significant number of miles to the offshore pipeline network, but this increase will likely occur over several years.

In an effort to accommodate additional offshore and onshore production, Phase 1 of the interstate Celeron-All American Pipeline project was completed in early 1987. This pipeline will potentially transport crude oil from the Santa Barbara Channel area and the central and northern Santa Maria Basin area to refineries on the Texas Gulf of Mexico coast.

Another interstate crude-oil pipeline is still in the permitting stage. Known as the Pacific Texas (Pactex) Pipeline project, this pipeline approximately parallels the same route as that of the Celeron-All American Pipeline and is proposed as an alternative

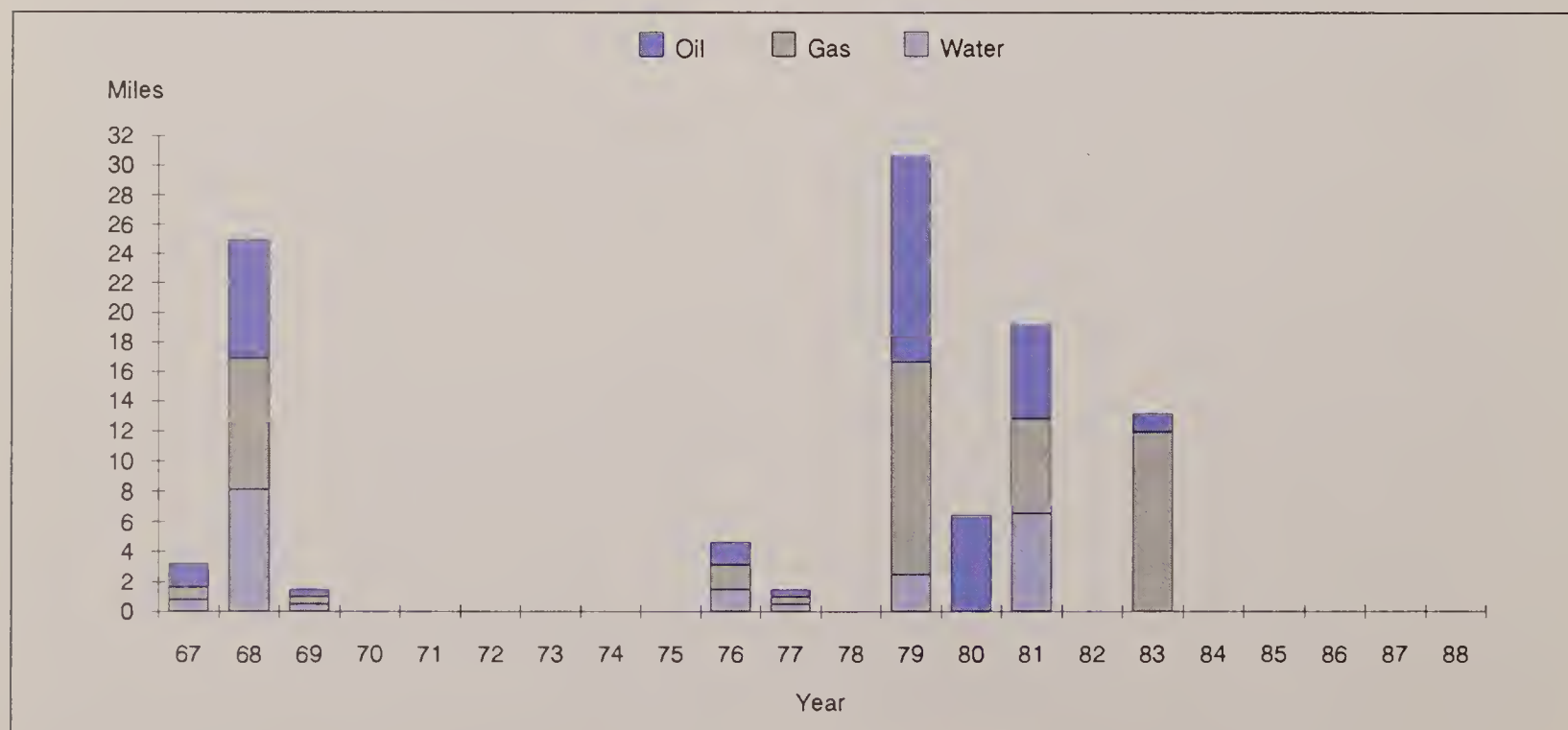


Figure 4-2. Offshore pipeline construction from sites originating in the Pacific OCS Region through September 1988.

Table 4-2. Existing and proposed OCS pipelines offshore California as of September 1988.

UNIT/ (field)	Platform	Pipeline operator	Landfall	Size and type	Status
SANTA YNEZ (Hondo)	Hondo(1) to shore Hondo to OS&T	POPCO Exxon	Las Flores Canyon	12-in gas 12-in oil 6-in fuel 8-in water	Operating
(Dos Cuadras)	C to B	Unocal	____(2)	6-in oil 6-in gas 6-in water	Operating
(Dos Cuadras)	B to A to Shore	Unocal	Rincon	12-in oil 12-in gas 6-in water	Operating
(Dos Cuadras)	A to Hillhouse	Sun	____(2)	8-in oil 8-in gas 6-in water	Operating
(Dos Cuadras/ Carpinteria Offshore)	Hillhouse to Henry	Sun	____(2)	8-in oil 6-in gas 8-in water	Operating
(Carpinteria Offshore)	Hogan to Houchin to shore	Phillips	La Conchita	10-in oil 12-in gas 10-in gas lift 4-in water	Operating
PITAS POINT/ (Pitas Point)	Habitat to shore	Pacific Interstate Offshore Company	Carpinteria	12-in gas	Operating
SANTA CLARA/ (Sockeye)	Gail to Grace	Chevron	____(2)	8-in oil 8-in gas 8-in service	Installed
SANTA CLARA/ (Santa Clara)	Grace to Hope (State waters) Hope to shore	Chevron	Carpinteria	12-in oil(3) 10-in gas(3) 10-in oil 10-in gas 10-in gas lift	Operating
SANTA CLARA/ (Santa Clara)	Gilda to shore	Unocal	Mandalay Beach	12-in oil 10-in gas 6-in water	Operating
(Hueneme)	Gina to shore	Unocal	Mandalay Beach	10-in oil/ gas (4) 6-in water	Operating
BETA/(Beta)	Ellen to Elly	SWEPI	____(2)	14-in oil 4-in gas	Operating
BETA/(Beta)	Elly to shore	SWEPI	Long Beach	16-in oil	Operating
BETA/(Beta)	Eureka to Elly	SWEPI	____(2)	12-in oil 6-in gas 10-in water	Operating
BETA/(Beta Northwest)	Edith to Elly	Chevron	____(2)	6-in oil	Operating
BETA/(Beta Northwest)	Edith to Eva (State waters) to shore	Chevron	Huntington Beach	6-in gas	Operating
(Point Arguello)	Hermosa to shore	Chevron	Point Conception	24-in oil 20-in gas	Installed
(Point Arguello)	Harvest to Hermosa	Texaco	____(2)	12-in oil 8-in gas	Installed
(Point Arguello)	Hidalgo to Hermosa	Chevron	____(2)	16-in oil 10-in gas	Installed
POINT PEDERNALES	Irene to shore	Unocal	Vandenberg Air Force Base	20-in oil 8-in gas 8-in water	Operating
POINT PEDERNALES	Independence to Irene	Unocal	____(2)	10-in oil 6-in gas	Proposed
(San Miguel)	Julius to shore	SWEPI	Guadalupe Field	20-in oil 10-in water 8-in service/ fuel	Proposed

(1) Oil from Platform Hondo is stored and treated on an offshore storage and treatment vessel, then offloaded on tankers.
Additional platform and pipeline emplacement options for the Santa Ynez Unit are currently under review.
(2) Indicates pipeline links two platforms.
(3) Lines from Platform Grace to Platform Hope.
(4) One line carries oil and gas.

route from marine terminals in the Los Angeles area for Alaskan North Slope crude.

Currently, California receives about 900,000 barrels per day of North Slope crude at its refineries, with the balance going to Gulf Coast refineries through the Panama Canal on tankers or through the Panamanian Pipeline, where it is again unloaded to tankers to complete its trip to those refineries.

A major intrastate project, known as the Southern California Pipeline System (SCPS), has also been proposed to transport crude oil from the Santa Barbara Channel area up to the San Joaquin Valley, where crude oil from onshore fields in this area will be added and then transported to refineries in the Los Angeles area.

ONSHORE SUPPORT FACILITIES

The search for and development of offshore hydrocarbons requires onshore support facilities that either process or transship materials or personnel to offshore locations where they are needed. Following an offshore discovery and its subsequent development, initial separation/treatment facilities located onshore are required to prepare the hydrocarbons produced offshore for shipment to refineries or processing plants or for sale to distributors.

The expression "onshore support facilities" as used in this report means shore-based facilities directly supporting the exploration, development, production, transportation, or treatment, separation, and refinement of hydrocarbons derived from offshore fields. These facilities include (1) major supply bases, (2) crew and light supply bases, (3) fabrication and assembly facilities, (4) onshore separation/treatment facilities, and (5) refineries and gas processing plants. Each of these categories of onshore facilities is discussed in greater detail below.

Alaska OCS Region

To date, all OCS-related oil and gas activities in Alaska have been exploratory. These activities require onshore support to a varying degree, but usually on a relatively short-term basis. Numerous locations on the coast of Alaska have been used to support the 69 exploratory wells that have been drilled on the Alaska OCS. These locations are identified and briefly described in table 4-3 on the next page. Recently, the only OCS exploratory pro-

grams conducted in Alaska occurred in the Beaufort Sea. Beaufort Sea exploration is generally supported from the Prudhoe Bay-Deadhorse industrial complex, which has supported onshore development and production programs since oil was discovered at Prudhoe Bay in 1967. The airfield and warehousing facilities used to support these offshore operations previously existed as part of the Prudhoe Bay onshore oil production operation.

An exception to this general pattern was made by Amoco during the 1986 drilling of its Mars Prospect, which was drilled from a 950-foot-diameter manmade spray ice island located 5 miles offshore Cape Halkett. Although the drilling rig was towed to the drill site from Deadhorse, the main work camp and airstrip were located onshore at Cape Halkett. The work camp pad, airstrip, and 5-mile service road connecting the camp and drill site were constructed of ice created by water flood.

Atlantic OCS Region

Offshore operations on the Atlantic OCS have also been exploratory in nature and have been supported by temporary service bases established and operated by (or contracted for) the offshore operators. Such temporary service bases are generally located at the most convenient shore-based location that will allow the operator to service and supply offshore drilling rigs efficiently, cheaply, and with a minimum of travel.

Since August 1976, when leasing and drilling began on the Atlantic OCS, three sites have been used or considered as temporary service and support bases. These include the port at Quonset Point-Davisville, Rhode Island; the harbor and port facilities at Morehead City, North Carolina; and the port at Brunswick, Georgia.

Presently, no permanent onshore facilities are dedicated to the support of OCS activities adjacent to the Atlantic OCS Region. With no commercial discoveries of hydrocarbons in the Atlantic OCS, such facilities are not needed.

Gulf of Mexico OCS Region

Onshore hydrocarbon production in the Gulf of Mexico started many years before offshore exploration began. As a result, the well-developed regional

Table 4-3. Actual or potential Alaska OCS Region support facilities

Name of facility	Type of service/support	Planning area serviced	Description of facility
Deadhorse Airport ARCO Airport	Airport	Arctic Subregion	6,500-ft paved airstrip, 5,500-ft gravel airstrip
West Dock East Dock Prudhoe Bay	Port	Arctic Subregion	Limited harbor facilities available late July to early September for use during approximately 6-week ice-free season for sea lifts. West Dock--1.5-mile gravel causeway; East Dock--shallow-water dock onshore
Oliktok Point Kuparuk	Port	Arctic Subregion	Limited harbor facilities
Dutch Harbor	Port	Bering Sea Subregion	Ice-free, deep-water, natural anchorage
Unalaska City Airport	Airport	Bering Sea Subregion	4,000-ft airport runway being extended by 2,000 ft
Cold Bay Airport	Airport	Bering Sea Subregion	2 paved runways--5,162 ft and 10,415 ft
Nome Harbor	Port	Bering Sea Subregion	Plans for a 3,600-ft gravel causeway dock with 27-ft draft capabilities; existing lighterage operations only
Nome Airport	Airport	Bering Sea Subregion	6,039-ft paved airstrip, 5,610-ft paved airstrip
Nome City Airport	Airport	Bering Sea Subregion	3,200-ft gravel airstrip
St. Paul Island Airport	Airport	Bering Sea Subregion	5,175-ft gravel airstrip
Unalakleet	Airport	Bering Sea Subregion	6,567-ft gravel airstrip
Moses Point	Airport	Bering Sea Subregion	4,653-ft gravel airstrip
Gambell on St. Lawrence Island	Airport	Bering Sea Subregion	4,251-ft gravel airstrip
Yakutat Airport	Airport	Gulf of Alaska Subregion	3,600 acres, with two helicopter hangar facilities
Yakutat/Monti Bay Harbor	Port	Gulf of Alaska Subregion	115-ft pier for workboats, deep water
Kenai Harbor	Port	Gulf of Alaska Subregion	Rig tenders deep-water dock at Nikiski (10 miles north of Kenai)
Homer Harbor	Port	Gulf of Alaska Subregion	City-owned deep-water dock on Homer spit
Homer Airport	Airport	Gulf of Alaska Subregion	7,400-ft paved airstrip
Kodiak Harbor	Port	Gulf of Alaska Subregion	Channel: minimum 22-ft MLLW* depth, 200-ft width; breakwaters: 1,250 and 760 ft long
Port Lions/ Kodiak Airport	Airport	Gulf of Alaska Subregion	2,600-ft gravel airstrip adjacent to U.S. Coast Guard base airfield
Seward Airport	Airport	Gulf of Alaska Subregion	4,600-ft paved airstrip
Seward Harbor	Port	Gulf of Alaska Subregion	Channel: minimum 15-ft MLLW* depth, 120-ft width; breakwaters: 2 rock mounds 1,060 and 1,750 ft long, with provision for further basin expansion

*MLLW = Mean lower low water, which is the lower of two low tides of unequal height occurring each tidal period of 24 hours, 40 minutes.

infrastructure that had evolved for onshore oil and gas production was easily expanded to accommodate offshore production. However, some specific support activities, such as platform fabrication, pipelaying, diving and transportation services, and boat building, owe their existence entirely to the offshore oil and gas industry.

The majority of these offshore facilities are located in Texas and Louisiana, where offshore exploration has been concentrated. Platform fabrication, boat building, transportation, supply, and diving services are located throughout the coastal regions of these two States and have become an important part of the local economy. Although some service companies form a permanent core group, many others form a loose assemblage that appears and disappears as the geographic focus of offshore activity shifts and the demand for services changes.

The locations of onshore support facilities for Gulf OCS exploration and development have been determined by their access to Gulf waters, as well as their proximity to areas of offshore activity. As a result, the areas of New Orleans, Houma, Morgan City, and New Iberia in Louisiana and of Beaumont, Houston, Freeport, and Corpus Christi in Texas have become centers for offshore platform and pipeline fabrication and work, supply, and crew boat operations. Helicopter support services have sprung up all along the Texas and Louisiana coast. Crude oil refineries, which support both onshore and offshore production and do not require proximity to the Gulf, have developed throughout the Gulf coast. However, refining capacity has generally been concentrated in the metropolitan areas of Lake Charles, Baton Rouge, and New Orleans, Louisiana, and Beaumont, Houston, Galveston, and Corpus Christi, Texas.

The fate of the support industries closely follows that of OCS exploration and development. Thus, support industries experienced steady growth through the mid- and late 1970's. Between 1980 and 1983, these industries prospered and expanded as the oil and gas industry expanded its Gulf capacity rapidly. Since then, the decrease in demand for oil and gas and the resultant drop in world prices have slowed drilling activity in the Gulf and have caused considerable hardship among the support industries.

Recent activity in the Alabama State waters of Mobile Bay and the Federal OCS Destin Dome area off northwestern Florida may require the development of an onshore support infrastructure in northwestern

Florida. Currently, onshore facilities have been developed in Mobile Harbor to support exploration and development in Mobile Bay. The bulk of drilling activity has occurred in Alabama State waters, but drilling in the adjacent Federal waters should increase substantially. Exploration in the Destin Dome area is being supported out of the Port of Panama City.

Because of its long history of offshore oil and gas production, the Gulf has the most well-developed onshore support base in the country. This support activity provides an important contribution to the local economy of many coastal communities in the Gulf.

Activity in the Pulley Ridge area off southwest Florida in the early 1980's was supported from Port Manatee, at the southern shore of Tampa Bay near its mouth. The Port of Panama City, Florida maintains a presence as a support base for activity in the Eastern Gulf of Mexico Planning Area despite the current decline in offshore exploration. Eastern Marine is also planning to develop a supply base at Panama City to service the eastern Gulf when activity increases in the future.

Approximately 40 percent of the U.S. oil refining capacity is located within the coastal zones of Texas, Louisiana, Mississippi, and Alabama. This area is recognized as a world leader in hydrocarbon processing.

Although many refineries were shut down at the end of 1987, others were kept relatively busy because of the lower feedstock prices caused by the decline in the price of oil. Figure 4-3 shows the design capacity and utilized capacity in barrels of oil per day of coastal refineries in the Gulf of Mexico OCS Region and the number of refineries shut down as of December 31, 1987. In this case, shutdown refineries are still available for future production.

The "utilized refining" capacity is the amount that a refinery processed on December 31, 1987. Texas and Louisiana represent about 93 percent of the Gulf Coast refinery design capacity. This percentage has remained relatively constant for several years. The Gulf of Mexico region boasts the largest gas processing capacity in the Nation. As shown in figure 4-4, Texas and Louisiana provide over 95 percent of the Gulf region's gas processing capacity. In terms of throughput, the five Gulf of Mexico States are equally impressive, providing 60 percent of total U.S. gas throughput.

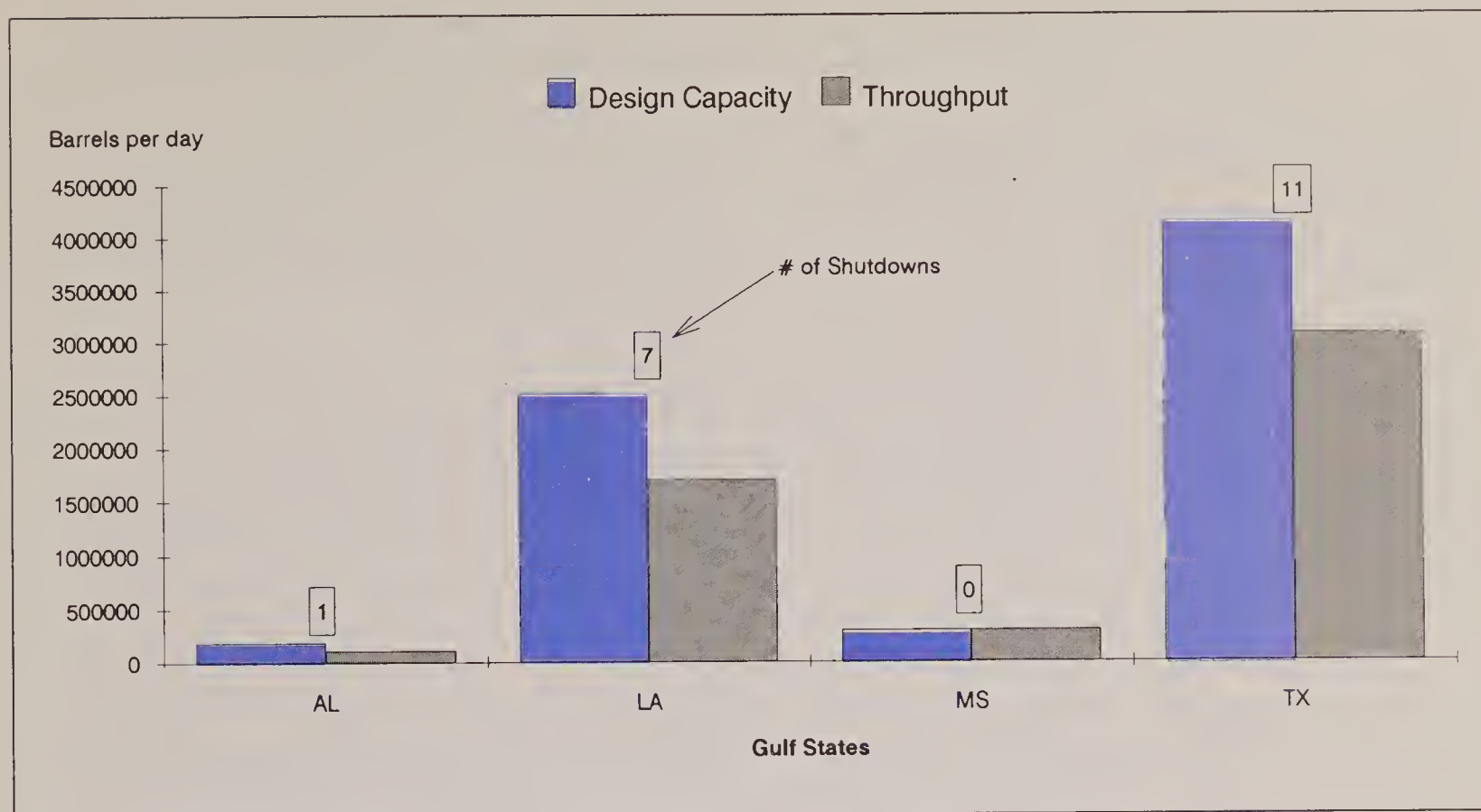


Figure 4-3. Design capacity, throughput, and number of shut-down Gulf of Mexico coastal oil refineries by State, as of December 1987.

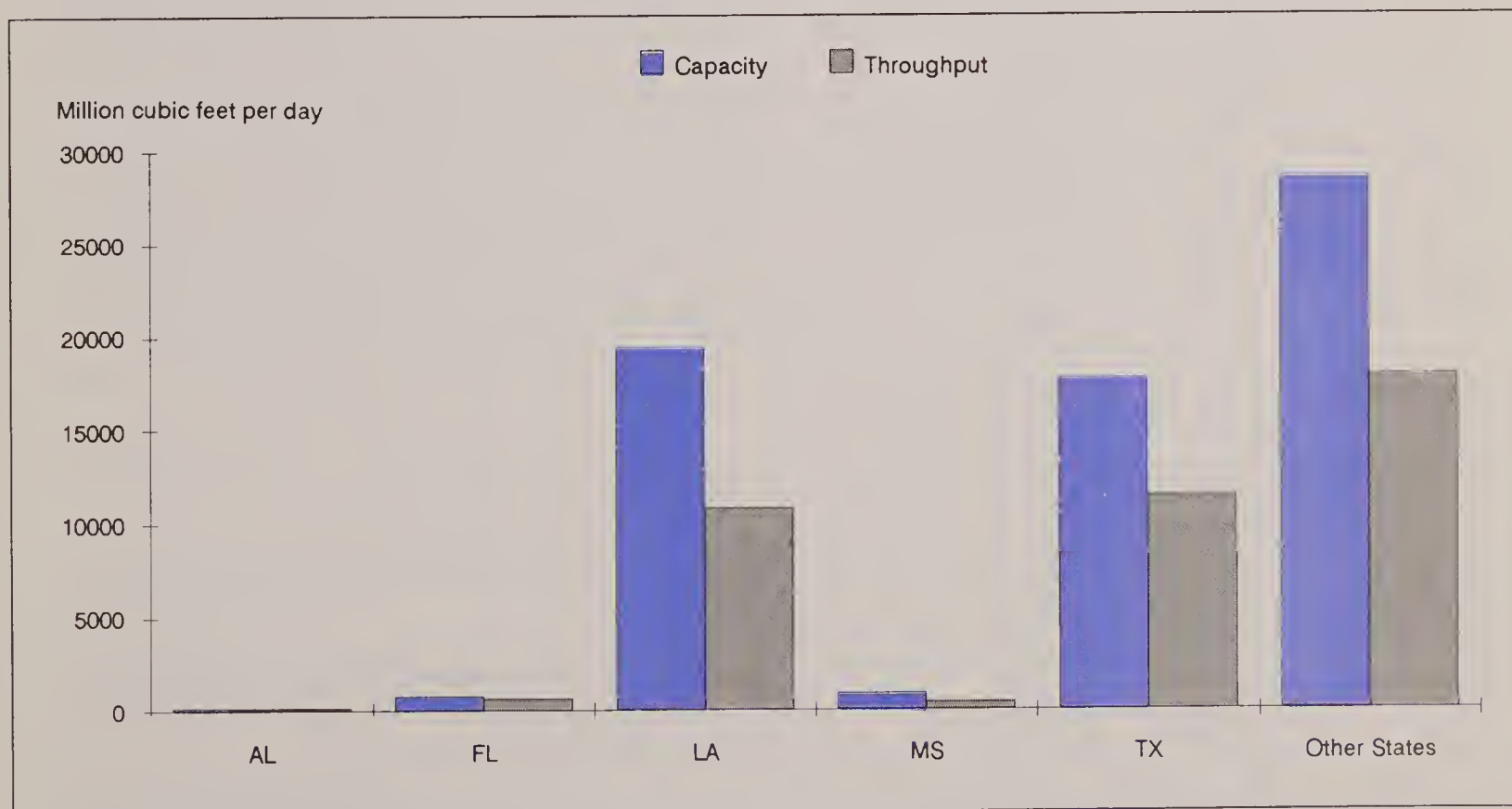


Figure 4-4. Gulf of Mexico regional area gas processing capacity and throughput compared with all other States as of December 1987.

Pacific OCS Region

In the Pacific OCS Region, all current offshore exploration and development work is being conducted in the Santa Maria Basin, the Santa Barbara Channel, and the San Pedro Basin, adjacent to Los Angeles. All major supplies destined for the Santa Maria Basin and the Santa Barbara Channel are transshipped through Port Hueneme, which is located in Ventura County. Supply operations for activities in the San Pedro Basin are based out of the Port of Los Angeles or the Port of Long Beach. The crew and light-supply bases that have been or are currently being used to support activities offshore California include Santa Maria Airport, Lompoc Airport, Ellwood Pier, Santa Barbara Airport, Carpinteria Pier, Ventura Harbor, Port Hueneme, Port of Los Angeles, and Port of Long Beach. Gaviota Pier and Goleta Pier have also been temporarily used as crew and light-supply bases. The location of these sites are depicted on the map plate inside the back cover of the *Pacific Summary/Index: June 1, 1986-July 31, 1987* (OCS Information Report MMS 87-0078). Copies of this plate can be obtained from the OCS Information Program upon request.

Offshore platforms are made up of a number of different components. These components include crew quarters, construction and production modules, the drilling rig (these components are sometimes referred to as topside components), decks, and jackets. During the development phase of offshore operations, operators may contract out all or parts of the construction of the offshore platform to more than one facility.

Several fabrication and assembly facilities located in California and Washington have been employed for producing the decks and jackets, but none of the existing yards currently have any related contracts on order. The jackets for Platforms Eureka, Henry, Hillhouse, Hondo, and Unocal's Platforms A, B, and C were built in Pacific Coast fabrication yards. See table 4-4 on the next page for the name and location of each of these sites.

In recent years, many of the construction contracts for platforms planned for offshore California have been awarded to Japanese, Korean, or Malaysian contractors because of their cost competitiveness. Currently, fewer than half of the jackets installed on the Pacific OCS have been produced by yards in the United States, although over 70 percent of the decks and topsides have been produced domestically.

Recently, more of the topside construction work for platforms offshore California has been awarded to Pacific Coast yards. Most recently, platform modules for Platform Gail were fabricated by Kaiser Steel at a yard in Stockton, California. Previous deck and module construction was performed by Pacific Coast yards in Port Hueneme, Oakland, Napa, San Bernardino, and Vallejo, California, and in Anacortes and Vancouver, Washington.

Because of the intimate relationship of onshore separation and treatment facilities with specific offshore development and production projects, this report addressed these issues together. Please refer to chapter 3 for a more detailed discussion of Pacific OCS development and production projects.

After processing at a separation and treatment facility, crude oil and natural gas produced offshore are transported to a refinery by either pipeline or by barge, where pipelines are not available. Most, though not all, operators of producing acreage offshore California have refineries located in the State. Where possible, crude-oil production is directed to those operator-owned refineries that have excess capacity and that are capable of processing crude having specific characteristics. Those operators that either do not have refineries within the State or that do not have excess capacity will usually either sell their production to local refineries or will transport it to other refinery locations on the Pacific or Gulf of Mexico Coasts. Table 4-4 presents a listing of existing Pacific Coast refineries and their operating capacities for the years 1985-87. Those refineries that process crude oil produced offshore California are indicated.

Additional Readings

U.S. Arctic Oil & Gas, National Petroleum Council, December, 1981.

St. George Basin Petroleum Development Scenarios Transportation Systems Analysis, Alaska OCS Region, September 1981.

Evaluation of Bering Sea Crude Oil Transportation Systems, Alaska OCS Region, July 1984.

An Analysis of "Buy America" Proposal for Offshore Drilling Rigs and Production Facilities, Staff Paper, Oceans and Environment Program, Office of Technology Assessment, United States Congress, June 1988.

Table 4-4. Pacific Coast active refineries and their operable atmospheric crude oil distillation capacity on January 1, 1985, 1986, and 1987

Company	Location	1985 Crude capacity (bpcd)(1)	1986 Crude capacity (bpcd)(1)	1987 Crude capacity (bpcd)(1)
CALIFORNIA				
ARCO	Carson (2)	188,000	215,000	216,000
		*27,000		
Beacon Oil Co.	Hanford	17,300	17,300	17,300
Champlin Petroleum, Inc.	Wilmington (2)	60,000	63,000	64,000
Chevron USA, Inc.	Bakersfield	26,000	26,000	Closed
	El Segundo (2,3)	357,000	390,000	390,000
		*48,000	*15,000	*15,000
	Richmond (2,3)	294,000	294,000	270,000
		*71,000	*71,000	*71,000
Coastal Petroleum Refiners, Inc.	Bakersfield	10,000	Closed	Closed
Conoco, Inc.	Santa Maria (2)	9,500	9,500	9,500
Edgington Oil	Long Beach (2)	41,600	41,600	41,600
Exxon Co.	Benicia (2,3)	109,000	109,000	120,500
Fletcher Oil and Refining Co.	Carson (2)	29,500	29,500	29,500
Gibson Oil & Refining	Bakersfield	9,500	9,600	9,600
Golden Eagle Refining Co., Inc.	Carson	*16,170	Closed	Closed
Golden West Refining Co.	Santa Fe Springs (2,3)	40,600	42,000	40,600
Huntway Refining Co.	Benicia (2)	7,300	8,000	7,000
	Wilmington (2)	5,500	5,500	5,500
Kern Oil & Refining, Inc.	Bakersfield	21,400	21,400	21,400
Lunday Thagard Co.	South Gate	8,100	8,100	8,100
MacMillan Petroleum Co.	Signal Hill (2)	11,000	11,000	14,000
Mobil Oil Corp.	Torrance (2,3)	123,500	123,000	123,000
Newhall Refining	Newhall	21,400	21,400	23,000
Oxnard Refining	Oxnard (2)	4,000	4,000	4,000
Pacific Refining Co.	Hercules (2)	55,000	55,000	55,000
Paramount Petroleum Co.	Paramount	32,000	32,000	32,000
		*14,500	*14,500	*14,500
	Bakersfield	*21,500	*20,500	*20,500
Powerine Oil Co.	Santa Fe Springs (2)	Closed	Closed	*33,400
Sabre Refining, Inc.	Bakersfield	Closed	10,000	*10,000
San Joaquin Refining Co., Inc.	Bakersfield	10,000	10,000	10,000
		*14,300	*14,300	*14,300
Shell Oil Co.	Martinez (2)	91,400	113,500	135,200
	Wilmington (2)	93,000	93,000	102,000
Sunland Refining Co.	Bakersfield	12,000	12,000	12,000
Texaco Refining and Marketing, Inc.	Bakersfield	38,000	38,000	38,000
	Wilmington (2,3)	*75,000	75,000	75,000
Tosco Corp.	Martinez (2,3)	126,000	126,000	126,000
Unocal Corp.	Wilmington (2,3)	108,000	85,500	108,000
			*22,500	
	Rodeo (3)	70,000	77,000	70,000
	Santa Maria (2,3,4)	41,000	41,000	41,000
West Coast Oil Co.	Oildale	10,000	*19,000	*5,000
		*9,000		
Western Oil Refining, Inc.	Long Beach	Closed	Closed	*19,200
	Total	2,377,070	2,393,700	2,430,700
OREGON				
Chevron USA, Inc.	Portland (3)	*15,000	15,000	**0
	Total	15,000	15,000	0
WASHINGTON				
ARCO	Ferndale (2)	146,000	146,000	163,000
Chevron USA, Inc.	Seattle (2,3)	5,500	5,500	**0
Mobil Oil Corp.	Ferndale (2)	71,500	77,000	77,000
Shell Oil Co.	Anacortes (2)	72,000	72,000	77,000
Sound Refining, Inc.	Tacoma (2)	11,900	11,900	*11,900
Texaco Refining and Marketing, Inc.	Anacortes (2)	78,000	78,000	78,000
U.S. Oil and Refining Co.	Tacoma (2)	26,400	29,500	32,000
	Total	411,300	419,900	438,900
Pacific Total Crude Capacity		2,803,370	2,828,600	2,869,600
National Total Crude Capacity		15,658,769	15,458,948	15,565,513
Total Operable Pacific Refineries		44	43	44
Total Operable National Refineries		219	213	219

(1) bpcd - barrels per calendar day.

(2) Refineries located in the coastal zone.

(3) Refineries processing California offshore oil.

(4) Serves as an upgrader with coke as its only saleable product.

* Currently idle, but was active during review period.

** Currently only conducting downstream operations.

Source: Adapted from U.S. Department of Energy, 1985, 1986, 1987.

5. Special Topics Related to the OCS Program

Offshore Strategic and International Minerals Program

The Office of Strategic and International Minerals (OSIM) is responsible for developing policy and coordinating the exploration, development, and recovery of nonenergy minerals from the U.S. Outer Continental Shelf. The OSIM was established (1) to provide overall programmatic direction and policy guidance to Federal offshore nonenergy-minerals activities and (2) to facilitate coordination between the Department of the Interior, coastal States, local governments, and the public sector for timely resolution of issues.

Activities and support are currently focused in seven areas: (1) cobalt-rich manganese crusts offshore Hawaii and Johnston Island, (2) phosphorites offshore North Carolina, (3) heavy-mineral placers and phosphorites offshore Georgia, (4) sand and gravel and heavy-mineral placers offshore the Gulf Coast States, (5) heavy-mineral placers offshore Alaska, (6) black sand deposits offshore Oregon, and (7) the development of a regulatory framework for offshore lease administration and mining operations.

Leasing potential is being evaluated by joint Federal-State task forces in cooperation with the adjacent coastal States. If leasing is determined to be economically feasible, it will then be followed by further resource and environmental studies as applicable. The task forces recommend appropriate actions to the Secretary of the Interior and the State Governor(s). Federal decisions to proceed to lease sales are made by the Secretary with review and comment from the Governor(s). To ensure protection of the environment, a case-by-case approach is pursued with environmental reviews and opportunities for public involvement.

Major accomplishments in cooperation with coastal States follow:

- A final EIS for possible leasing of cobalt-rich manganese crusts offshore Hawaii and Johnston Island will be completed by early 1989. A lease sale decision is contingent upon industry interest and legislation providing jurisdiction

under the OCS Lands Act for Johnston Island. A cooperative agreement which increases State participation in planning and review of activities is expected late 1988.

- "The Economic Feasibility of Mining Phosphorite Deposits of the Continental Shelf Adjacent to North Carolina" report was completed by the Federal-State of North Carolina Task Force in May 1988. A *Federal Register* notice was published concurrent with release of the report asking for public comment. The report and a request for comments were also sent to the American Mining Congress and all phosphate companies urging their review. These comments are being used to determine future activities, if any, related to mining phosphorites offshore North Carolina.
- The Federal-State of Georgia Task Force completed an economic feasibility study for heavy minerals and phosphorites offshore Georgia. A final report entitled "Resource Assessment Study for Georgia Offshore Minerals" is scheduled to be completed in December 1988. Public and industry comments will be sought on the final report as was done with the North Carolina study.
- A joint Federal-Multi-State Task Force was formed in January 1987 by MMS and the States of Alabama, Louisiana, Mississippi, and Texas. The task force is studying potential deposits of marine minerals located off the coasts of these four States. An economic reconnaissance study was initiated in August 1987 to focus on available data and information.
- A Federal-State of Alaska Coordination Team was established in February 1988 to examine the resource potential of marine minerals offshore Alaska. As a result of ongoing gold dredging under a State lease and current industry interest, the first focus is an extension of that leasing activity in Norton Sound into Federal waters. A draft EIS was issued for a proposed Norton Sound Lease Sale and a sale is planned for early 1990.

- A Federal-State of Oregon Task Force was established in September 1988 and is conducting an analysis of the economic potential of heavy-mineral placers in black sands offshore Oregon.
- Regulations covering prospecting, leasing, and operations for marine minerals are being developed sequentially through a multiagency task force with expertise in marine mining, technology, and the environment. The rulemaking process for prospecting regulations began with the publication of an advance notice of proposed rulemaking in December 1984 and concluded with the July 5, 1988, *Federal Register* notice containing the final rule. Development of leasing and operating regulations began in 1985 and 1987, respectively, and culminated with the publication of the proposed regulations in the *Federal Register* on August 18, 1988, 53 FR 31424 and 53 FR 31442, respectively. The public comment period on these rules closed November 2, 1988. The development and finalization of these regulations have been attended by considerable open discussion with industry, academia, environmental groups, and State and Federal government representatives. The offshore Nome, Alaska OCS Mining Program, Norton Sound Lease Sale is the first scheduled to be held under these new regulations.

For more information on the Offshore Strategic and International Minerals Program, contact Mr. James Workman, Program Director, at (703) 787-1300.

Coastal Zone Management Program

The Coastal Zone Management Act (CZMA) was enacted in 1972 to promote the wise use and management of the Nation's coastal resources. It was designed as a voluntary program to encourage the individual States to manage their coastal areas through implementation of federally approved coastal zone management programs (CZMP's). As an incentive to participate in the program, States are given Federal dollars to develop and maintain (on a cost-sharing basis) the State program and the ability to veto Federal activities "directly affecting" the coastal zone that are not consistent with the State CZMP. The program is administered by the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce.

In January 1984, the Supreme Court ruled (*Secretary of the Interior v. California*, a 104 S. Ct. 656) that the consistency provision of the CZMA did not apply to OCS oil and gas lease sales since these sales do not directly affect the coastal zone. Following this ruling, NOAA began a review of its existing CZMA regulations to exclude OCS lease sales from the Federal consistency requirements. The resulting amendments to the NOAA regulations became effective on November 11, 1985 (50 FR 46422).

COASTAL ZONE MANAGEMENT ACT REAUTHORIZATION

Public Law 99-272, signed into law on April 7, 1986, provided for a 5-year reauthorization of the Coastal Zone Management Act (CZMA) of 1972, as amended (16 U.S.C. 1451 et seq.). In reauthorizing the Act, Congress enacted a provision that reduces administrative grants provided by the Federal Government to the States. During fiscal year 1986, the Federal to State ratio of funding for administration of State coastal management programs was 4 to 1. Over the life of the reauthorization, this ratio is to decline to a 1 to 1 level using the following schedule and ratios: 2.3 to 1 for fiscal year 1987; 1.5 to 1 for fiscal year 1988; and 1 to 1 for fiscal years 1989 and beyond.

The reauthorization language also amended section 306(g) of the CZMA and now requires States to promptly notify, and submit for approval by, the Secretary of Commerce of any proposed amendment, modification, or other program changes. In return, the Secretary is now obligated to respond to such proposed changes within 30 days of their receipt, or within 120 days of receipt if an extension is required. Extensions for Secretarial review beyond 120 days are authorized only for purposes of compliance with the National Environmental Protection Agency (NEPA) (42 U.S.C. 4321 et seq.). The Office of Ocean and Coastal Resource Management (OCRM) within the NOAA, which administers the CZMA for the Secretary of Commerce, will develop and publish regulations to implement the reauthorization language.

Rigs-to-Reefs Program

The presence of offshore oil and gas platforms (or rigs) in the Gulf of Mexico for the past 40 years has provided an important manmade resource to the area in the form of hard substrate for biological organisms. The realization of the value of these rigs, while in place, to commercial and recreational fishing has prompted Federal, State, and private interests to consider expanded use of these rigs as artificial reefs. In those areas of the Gulf where offshore production is not yet present, both the States of Alabama and Florida have sponsored the placement of obsolete rigs to serve as artificial reefs. The rigs are towed from production sites in the central Gulf. Table 5-1 on the next page lists the existing and permitted rigs-to-reefs projects in the Gulf.

Since offshore production began in the Gulf of Mexico, over 400 structures have been removed (see fig. 5-1, p. 121). This number is expected to increase substantially in the future as Gulf of Mexico OCS production continues to mature. In 1985, the National Research Council estimated that by the year 2000 there would be over 2,000 platforms removed from the Gulf of Mexico. Although most of this activity will involve the relatively inexpensive removal of shallow-water platforms, the number of deeper rigs to be removed, at significantly higher cost, also will increase. Costs for the removal of the deep platforms (more than 1,000 feet, or 305 m) planned for the Gulf are estimated to range up to \$100 million (National Research Council, "Disposal of Offshore Platforms" 1985, 76 p.). The prospect of a greater number of rigs to be removed, some at higher cost, has caused the oil industry to press for alternatives to the current removal requirements (Ocean Construction Report, 1986, vol. 12, no. 8, Feb. 24., p. 2).

In 1984, the National Fishing Enhancement Act was signed into law to facilitate the use of artificial reefs in U.S. waters. A National Artificial Reef Plan, mandated by the 1984 Act, was released on November 14, 1985 (50 FR 220). Within the Gulf States, Texas has permitted several sites for the placement of oil- and gas-related artificial reefs and has earmarked State funds to maintain these sites. (Currently, the only permitted oil- and gas-related artificial reefs off Texas are accidentally sunken drilling rigs.) In July of 1986, the Governor of Louisiana signed into law the Louisiana Fishing Enhancement Act (Louisiana Act 100) designed to retain for the long term some of the fishery benefits afforded by the "de facto" reefs

resulting from offshore energy development over the past 30 years. Through the cooperation and assistance of the Louisiana Artificial Reef Initiative, an advisory group and a State artificial reef plan was developed identifying eight offshore planning areas where artificial reef projects can be sited. By the end of 1988 the State had constructed three rigs-to-reef projects on sites within three of the established planning areas. Off the Mississippi coast, Mississippi Gulf Fishing Banks, Inc. is planning a rigs-to-reefs project in conjunction with the State (see table 5-1 on the next page).

Many considerations must be weighed, however, before an obsolete offshore rig can be used as a fishing reef, either by toppling it in place or by towing it to another location. Major issues include existing regulations, navigational and military concerns, and incentives and liability.

Current MMS regulations require the removal of all unusable oil- and gas-related equipment within 1 year of lease termination. These regulations comply with Article 5 of the 1958 Convention on the Continental Shelf, an international treaty to which the United States is a party. (The 1958 Convention provides international guidance on the disposition of offshore structures.) Under current practice, most platforms are towed to shore and cut up for scrap metal.

In response to passage of the National Fishing Enhancement Act and industry's concerns, MMS issued a notice of proposed rulemaking on March 5, 1986 (51 FR 7584-7585), which would make it possible for obsolete oil and gas structures to remain in place under permits granted by the Army Corps of Engineers. The comment period for this proposed rulemaking ended on June 3, 1986. The Army Corps, responsible for issuing navigational permits for offshore structures, issued a proposed rule on July 26, 1985 (50 FR 30479-30481), to implement the National Fishing Enhancement Act. On November 13, 1986, the Army Corps published a final rule on the permitting of domestic artificial reefs (51 FR 41206).

Placement of oil- and gas-related artificial reefs, in shallow-enough waters to be convenient to fishermen, requires careful consideration of navigational concerns. Once they are in place, a navigational buoy system must be installed and maintained. Although while rigs/reefs may not present a navigational hazard for commercial vessels in deeper water, they are a navigational concern for the operation of U.S.

Table 5-1. Existing and permitted rigs-to-reefs projects on the Gulf of Mexico OCS through September 1988

Reef identification	Planning area	Reef location(2)	Water depth (ft)	Distance to shore (miles)	Former owner or donor	Reef sponsor	Year added
Topper III Reef(1)	Western	High Island(2) A-471	196	89	Zapata	Mobil Oil	1977
Tower S Reef	Eastern	Apalachicola 686	126	25	Exxon	Florida Dept. of Natural Resources	1979
Arco Reef(1)	Western	North Padre Is. 985 and 980	97	18	Dixilyn Field 81	Arco	1981
Pensacola Reef	Eastern	Pensacola 983	175	22	Tenneco	Florida Dept. of Natural Resources	1982
Marathon Reef	Eastern	Destin Dome 486	240	50	Marathon	Alabama Dept. of Conservation and Natural Resources	1983
Penrod Reef(1)	Western	Matagorda Is. 657	68	12	Penrod	Penrod	1983
Panama City Reefs Stage 1	Eastern	Pensacola 1006	100	12	U.S. Navy	Bay County, Florida	1984
Stage 2	Eastern	State waters	60	3	U.S. Navy	Bay County, Florida	1984
Tenneco Reef	South Atlantic(3)	State waters	1 - 400	1.5	Tenneco	Florida Dept. of Natural Resources	1985
Shelter Reef	Central	South Marsh Is. 146	240	90	Cities Service	Louisiana Dept. of Wildlife & Fisheries	1987
Snapper Reef	Central	South Timbalier 128	101	28	Chevron	Louisiana Dept. of Wildlife & Fisheries	1988
(Unnamed)	Central	West Cameron 616/617	310	120	Exxon/Mobil	Louisiana Dept. of Wildlife & Fisheries	1988
Permitted Artificial Reef Sites Awaiting Oil and Gas Structure							
South Padre Island Reef	Western	South Padre Is. 1070	95	15	--	State of Texas	
Port Arkansas Reef	Western	Mustang Island 802	110	18	--	State of Texas	
Matagorda Bay Reef	Western	Matagorda Is. 616	108	21	--	State of Texas	
Freeport Site Reef	Western	Galveston A-22	100	30	--	State of Texas	
Rio Grande Artificial Reef	Western	State waters	72	7	--	Port Isabelle & South Padre Is. Artificial Reef Committee	
Okaloosa site	Eastern	Pensacola 942	354	22	--	Okaloosa County, FL	
Pinellas site	Eastern	--	--	--	--	Pinellas County, FL	
(Unnamed)	Central	Main Pass 165	130 - 165	60	--	Mississippi Gulf Fishing Banks, Inc.	

(1) Resulted from accidental sinking of a drilling rig.

(2) OCS administrative area and block number, or "State waters."

(3) The only rigs-to-reefs project nationwide not located in the Gulf of Mexico.

SOURCE: Villere C. Reggio, 1988, MMS Gulf of Mexico OCS Region, February, personal commun.

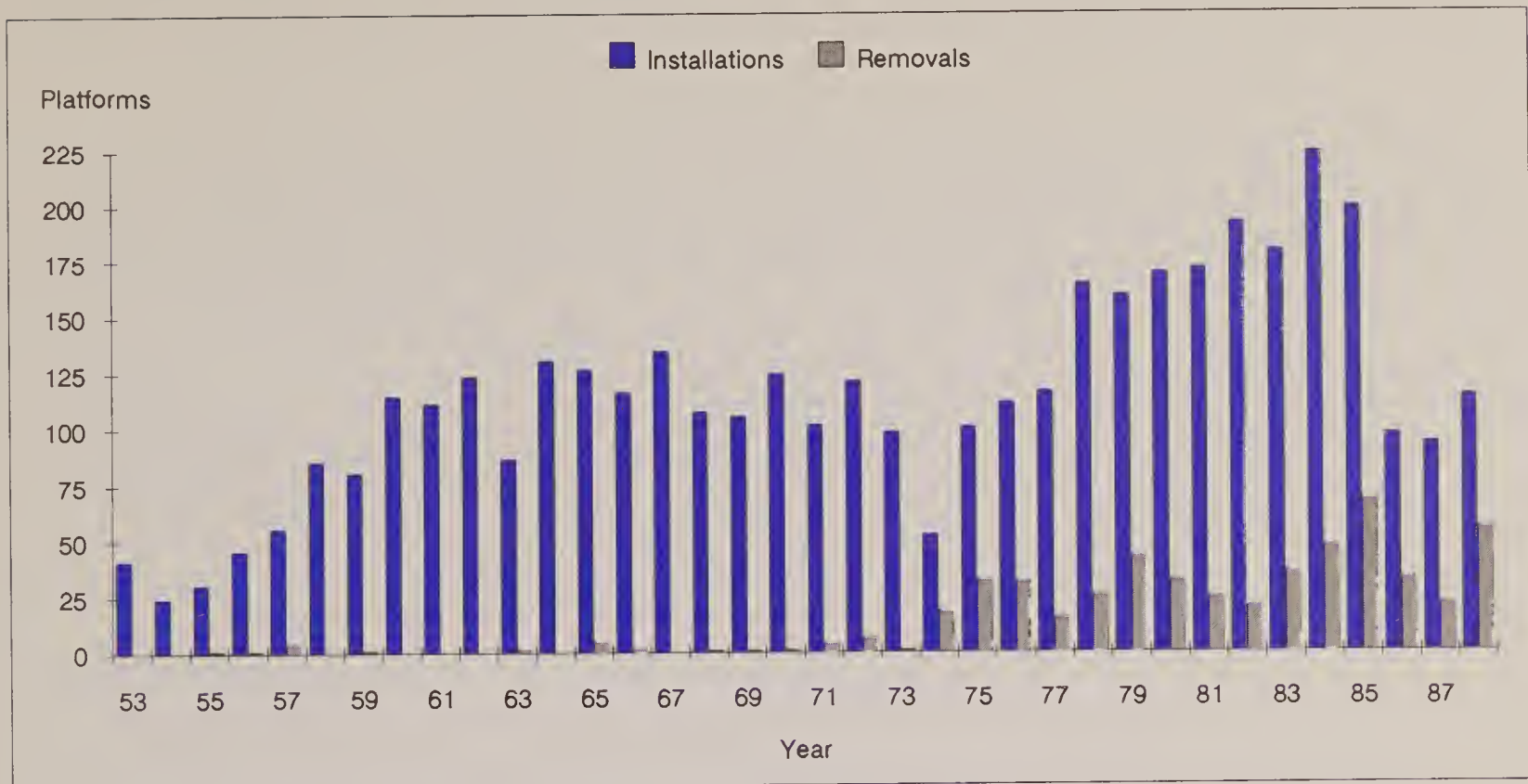


Figure 5-1. Yearly installations and removals of offshore production platforms on the Gulf of Mexico OCS, 1953 through September 1988.

Navy submarines. The large metal structures also can interfere with the detection of unfriendly forces off U.S. coasts (Petroleum Engineer International, 1986, vol. 58, no. 2, Feb., p. 35-41.).

Although the National Fishing Enhancement Act and resulting National Artificial Reef Plan represent a recognition of the value of artificial reefs (including offshore rigs), they do not address the offshore industry's two major concerns--incentives and liability. In many cases, the savings realized in donating a platform do not sufficiently exceed the costs incurred (towing the rig to site, etc.) to make donation practical without some sort of incentive. Although considered, tax incentives to oil companies for platform donation were not included in the final version of the 1984 Act. Moreover, liability laws pertaining to U.S. waters, as well as international

waters, are specifically designed to prevent the abandonment of structures. Before agreeing to donate a platform for use as an artificial reef, an offshore operator must be certain that the company will not be held liable for any damages that may result. In most of the cases to date, the States have accepted liability for the platforms placed off their coasts.

In November 1987, the International Conference on Artificial Fisheries Habitat was convened. A special session of this conference focused on the rigs-to-reefs topic. During 1989, the MMS will publish the proceedings of this special session.

Appendix A. Geologic Reports Available from MMS

The following list of geologic reports are available from MMS. OCS reports are available for review at the Technical Publications Unit in the Office of Offshore Information and Publications in Herndon, Virginia. All other reports are available while supplies last through the regional offices at the following addresses.

ALASKA
Library
Alaska OCS Region
Minerals Management Service
949 East 36th Ave., Room 110
Anchorage, AK 99508-4302
(907) 261-4435

GULF OF MEXICO
Public Information Section
Gulf of Mexico OCS Region
Minerals Management Service
1201 Elmwood Park Blvd.
New Orleans, LA 70123
(504) 736-2519

ATLANTIC
Public Information Officer
Atlantic OCS Region
Minerals Management Service
381 Elden St.
Herndon, VA 22070-4871
(703) 787-1113

PACIFIC
Public Affairs
Pacific OCS Region
Minerals Management Service
1340 West 6th St.
Los Angeles, CA 90017
(213) 894-2062

TECHNICAL PUBLICATIONS UNIT
Office of Offshore Information
and Publications
Minerals Management Service
381 Elden St.
Herndon, VA 22070-4871
(703) 787-1029

Report number	Title	Author	Published
OCS-0001	Geological and operational summary, COST No. B-2 well, Baltimore Canyon Trough area, Mid-Atlantic OCS.	M. A. Smith et al.	1976
OCS-0002	Geologic and operational summary, COST No. B-3 well, Baltimore Canyon Trough area, Mid-Atlantic OCS.	R. V. Amato and E. K. Simonis	1979
OCS-0003	Geologic and operational summary, COST No. G-1 well, Georges Bank area, North Atlantic OCS.	R. V. Amato and J. W. Bebout	1980
OCS-0004	Geologic and operational summary, COST No. G-2 well, Georges Bank area, North Atlantic OCS.	R. V. Amato and E. K. Simonis	1980
OCS-0005	Geological and operational summary, COST No. GE-1 well, Southeast Georgia Embayment area, South Atlantic OCS.	R. V. Amato and J. W. Bebout	1978
OCS-0006	Geological studies of the COST No. GE-1 well, United States South Atlantic Outer Continental Shelf area.	P. A. Scholle	1979
OCS-0007	U.S. Geological Survey program of offshore resource and geoenviromental studies, Atlantic - Gulf of Mexico Region, from September 1, 1976 - December 31, 1978.	D. W. Folger and S. W. Needell	1983
OCS-0009	Geologic hazards and constraints to oil and gas operations on the U.S. South Atlantic Outer Continental Margin, an overview.	B. S. Drucker	1983
OCS-0011	Geologic and operational summary, Norton Sound COST No.1 well, Norton Sound, Alaska.	R. F. Turner et al.	1983
OCS-0012	Geologic and operational summary, Norton Sound COST No.2 well, Norton Sound, Alaska.	R. F. Turner et al.	1983
OCS-0053	Geological studies on the COST No. B-2 well, United States Mid-Atlantic Outer Continental Shelf area.	P. A. Scholle	1977

124 OCS National Compendium

Report number	Title	Author	Published
OCS-0058	Geological studies of the COST No. B-3 well, United States Mid-Atlantic Continental Slope area.	P. A. Scholle	1980
OCS-0059	"Geological studies of the COST No. G-1 and G-2 wells," United States North Atlantic Outer Continental Shelf.	P. A. Scholle and C. R. Wenkam	1982
OCS-0100	Geologic estimates of undiscovered recoverable oil and gas resources in the United States.	B. M. Miller et al.	1975
OCS-0211	Geologic framework, petroleum potential, petroleum resource estimates, environmental hazards, and deep-water drilling technology of the Maritime Boundary region, offshore Southern California Borderland.	R. B. Powers	1981
OCS-0222	Geologic studies of the Point Conception deep stratigraphic test well OCS-CAL 78-164 No. 1, Outer Continental Shelf Southern California, United States.	H. E. Cook	1979
OCS-0237	Geologic and operational summary, Southern California deep stratigraphic test OCS-CAL 75-70 No. 1, Cortes Bank area offshore Southern California.	R. G. Paul et al.	1976
OCS-0262	Fourth report of Review Committee on Safety of Outer Continental Shelf Petroleum Operations to the United States Geological Survey.	Marine Board	1975
84-0022	Geology report, proposed Mid-Atlantic OCS oil and gas lease sale 111.	G. B. Carpenter and R. V. Amato	1984
84-0062	Geology report, proposed North Atlantic OCS oil and gas lease sale 96.	G. B. Carpenter and R. V. Amato	1985
85-0012	Estimates of undiscovered, economically recoverable oil and gas resources for the Outer Continental Shelf as of July 1984.	L. W. Cooke	1985
85-0042	Proposed Southern California Planning Area, OCS Lease Sale 95.	F. L. Webster, D. J. Burdick, D. G. Griggs, and K. A. Yenne	1985
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85-0101	Pacific OCS lease sale, October 1, 1964, Oregon and Washington.	F. L. Webster	1985
85-0111	Geologic report for the Beaufort Sea Planning Area, Alaska: Regional geology, petroleum geology, environmental geology.	J. D. Craig, K. W. Sherwood, and P. P. Johnson	1986
86-0025	Geologic report, proposed Northern California Planning Area, OCS Lease Sale No. 91.	F. L. Webster, D. J. Burdick, and K. A. Yenne	1986
86-0033	Geologic report for the Norton Basin Planning Area, Bering Sea, Alaska.	R. F. Turner, ed., G. C. Martin and D. E. Risley	1986
86-0048	United States Outer Continental Shelf basins: Maps and descriptions.	G. Dellagiarino	1986
87-0003	Geological & geophysical data acquisition, Outer Continental Shelf through fiscal year 1985, resource evaluation program report.	G. B. Tirey, D. Zinzer, and P. Fulton	1987
87-0026	Correlation of Cenozoic sediments, Gulf of Mexico Outer Continental Shelf, Part 1: Galveston area offshore Texas through Vermilion area offshore Louisiana.	J. C. Reed, C. L. Leyendecker, A. S. Kahn, C. J. Kinler, P. F. Harrison, and G. P. Pickens	1987

Report number	Title	Author	Published
87-0030	Geologic report for the St. George Basin planning area, Bering Sea, Alaska	C. D. Comer, B. M. Herman, and S. A. Zerwick	1987
87-0046	Geologic report for the Chukchi Sea planning area, Alaska.	D. K. Thurston and L. A. Theiss	1987
87-0108	Pacific Outer Continental Shelf lease sale May 14, 1963, Northern and Central California.	Webtser	In Press
87-0109	Geological and operational summary, Kodiak Shelf stratigraphic test wells, western Gulf of Alaska.	R. F. Turner, ed.	1988
88-0036	Estimates of oil and gas reserves, Gulf of Mexico Outer Continental Shelf, December 31, 1987.	J. M. Melancon, J. P. Brooke, J. W. Compton, and J. H. Knipmeyer	1988
88-0047	Estimates of oil and gas reserves, Pacific Outer Continental Shelf, as of December 31, 1987.	P. J. Raftery and S. A. Wolfson	1988
88-0081	Geology report: Central California Planning Area. and K.A. Yenne	F. L. Webster, D. J. Burdick	In Press

Appendix B. Bibliography of OCS Information Reports

The following is a regional listing of documents published by the OCS Information Program. Entries are arranged by title in reverse chronological order, listing the most recent publication first. Requests for copies of these publications should be directed to:

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Alaska Region

ARCTIC SUBREGION SUMMARY REPORTS AND UPDATES

- Arctic Summary Report, January 1985, Outer Continental Shelf Oil and Gas Activities in the Arctic and their Onshore Impacts. Christopher W. Lynch, Douglas L. Slitor, and Robert W. Rudolph. 1985. OCS Information Report, MMS 85-0022, U.S. DOI, 84 p.
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- Pacific Summary Report/Index: June 1, 1986 - July 31, 1987. Jeffrey D. Wiese and Douglas L. Slitor. 1987. OCS Information Report, MMS 87-0078, 143 p.
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- OCS Directory, Federal and State Agencies and Their OCS-Related Responsibilities. 1988. OCS Information Report, MMS 88-0058, 149 p.

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- Federal Offshore Statistics: 1987, Leasing, Exploration, Production, and Revenues. 1987 Annual. OCS Report MMS 89-0010, 95 p.
 - Oil and Gas Leasing/Production Program: Annual Report/FY 1987. 1988 Annual. OCS Report MMS 88-0009, 36 p.
 - Offshore Scientific and Technical Publications, Spring/Summer 1988. 1988 Quarterly. Offshore Information and Publications, 15 p.
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 - OCS Regulations, Related to Mineral Resource Activities on the Outer Continental Shelf. 1989. Offshore Information and Publications. MMS-88-0026, one volume.
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